

RESEARCH REPORT



"Home Electronic" Bus Project



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"HOME ELECTRONIC" BUS PROJECT

Pre-Wiring For The Future

Prepared By
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Vice-President and Director
Smart Lifestyles

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EXECUTIVE SUMMARY

The automated house is no longer just a futuristic dream. Computer-controlled systems that regulate temperature, electrical and natural lighting, ventilation and many other systems in our homes have become readily available. Discerning consumers are seeking fully automated electronic features such as "smart" security systems for their homes. The consumer electronics industry has recognized that fully automated housing is becoming more common and will someday be the norm for new housing projects.

For that to be possible, though, the cost of wiring installations for such systems will have to come down. Although wiring for basic equipment such as telephone and cable TV is currently being incorporated at the design stage of modern housing projects, wiring installations for integrated network communications and control systems are expensive and not within the normal budget constraints of most consumers. One reason for the high cost is that traditional house wiring media and technology are not compatible with the hard wiring needs of most sophisticated electronic communications and control systems.

If residential wiring systems are to meet both current and future needs of consumers, whose expectations are quickly expanding, integrated network systems must be developed. The "Smart House Limited Partnership", a group in the U.S., have recognized the need for an integrated network pre-wiring package. "Smart-Redi", a Smart House pre-wiring package was developed in recognition of this need. There have also been several other private sector efforts to develop pre-wiring systems for intelligent communications network systems for automated housing. The "Home Electronic Bus Project" (HEBP), is one Canadian firm's contribution to this effort.

The "HEBP" adapted the best of several existing system and developed a prototype cable and electrical outlet system for installation at "Telosky Village", a new housing project in B.C. The objectives of the "HEBP" were to develop a simple and economical system using current technology. It was designed to supply the electrical power to traditional electrical equipment and also provide for the economical implementation of sophisticated home control and communications systems with a capacity to interface with outside systems and networks. The system had to be easily installed by trained electrical and low voltage contractors, and be capable of meeting the current and future electrical power needs of the dwelling.

The project, now completed, has successfully demonstrated an integrated intelligent network system. The proponents of the project have judged it to have been very successful for both the advancement of home automation technology and the successful marketing of the Telosky Village project.

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PART I - EXECUTIVE SUMMARY

Ronald B. Dewhurst
Executive Secretary
Director

Ronald B. Dewhurst, a post graduate student of Computer Software/Electronics Technologies has been involved in home automation consulting, design, and implementation for eight years. Formerly President of Maple Ridge Compuhome and director of Adaptable Housing Ltd., Mr. Dewhurst now serves as Vice-President of Research and Development for Smart Lifestyles Ltd., the largest home automation company in Canada.

Mr. Dewhurst is known as one of the pioneers in the implementation and introduction of home automation technology to the North American market. Recognized worldwide for projects such as Telosky Village, the design of the first home automation showroom in Canada, he works with leading innovative companies such as Unity Systems, Custom Command, Smart House, and Square D in bringing high-tech home electronics to the marketplace.

Patrick Simpson
President
Director

Mr. Simpson, leaving behind a diverse business background from Real Estate to Land Development as Vice-President of Hollyglen Holdings entered the Home Automation Industry in 1988. A co-founder of Adaptable Housing, Mr. Simpson served as President of this successful start-up home automation company which broke new grounds in the marketing, development, and implementation of home automation to the housing industry. "Telosky Village", the landmark project of Adaptable was recognized worldwide for its ground breaking design. Features which included a pre-wiring design and adaptable features, stressing accessibility.

PART II - BACKGROUND

In the consumer electronics industry there is a large and growing interest in the field of home automation, but what is home automation and how may we define it.

We can state that it is the effect of installing communicating micro-processor-based products and systems in homes. This would apply to the vast array of products, systems, and services for homes including security, communication, heat, ventilation, and air conditioning, entertainment, lighting, appliances and energy.

The above intelligent subsystems in the house via communication capabilities can incorporate information from another product/subsystem or several other products/subsystems to achieve higher functional levels and enhanced consumer benefits for its own category.

An example is an intelligent heating subsystem controller that receives data from a motion detector in the security system when someone enters a room. Upon recognizing the room is occupied the security subsystem notifies the heating controller which in turn will turn on the heat in the area. When the room is vacant the room is placed in setback conserving energy via the same cross-system communication capability.

A new 445 page report in regard to Smart home semi-conductors and electronics from the Rose Associates, Los Altos, California. A high-tech marketing consulting company makes the following claim about home automation;

"Smart home electronics, using the latest technological developments, such as intelligent distributed control and spread spectrum modulation, promises to be the next major market for semi-conductor and electronic system component manufacturers. After completing this study, I'm more certain than ever that smart home electronics will be the major product of the next decade."

So, the housing market is poised on precipice of a major revolution in home technology. What is the first requirement for the initiation of this technology into the housing marketplace. Simply, it is the development of a communications network within the home, which is suitable for existing and new homes. That is the focus of the "Home Electronic Bus Project".

PART III - OBJECTIVES

In order to enhance the probability that the home automation business will grow rapidly, the communications network, must be kept as simple as possible using as much of today's wiring media and technology as possible. The bus must have a pre-engineered template which requires minimal system design and support.

Therefore, it will be an economically viable network that can be easily installed by trained electrical and low-voltage contractors, utilizing these basis requirements.

- A simple system, with tremendous expansion capability, that uses today's wiring and installation procedures.
- Aimed at both retrofit and new housing markets.
- Flexibility, allow the economic implementation of the simplest light control to the most sophisticated central home control system with products from different companies and product sectors.
- A plug and play modular design that allows the incremental installation of products to the network as the homeowner's needs expand.
- Create a communication and control network that can be easily interfaced to outside systems and networks.

Home networks, the creation of home networks, the design of home networks, the implementation of home networks is the key. They are the enablers of the industry.

PART IV - SYSTEM DESIGN, IMPLEMENTATION AND TESTING

DESIGN

To date, all electronic networks within the home have been proprietary. Home automation companies such as Unity, Home Automation Inc., Custom Command, etc. have used their own twisted pair, powerline and coaxial network schemes for enabling automation. Specialized highly trained representatives from each company design, implement and install these proprietary networks. This strategy can only serve to slow down industry growth due to its specialized nature.

As stated before, the fundamental necessary tenet underlying stimulating industry growth and acceptance is the design of broad networks that allow products from diverse industries and companies to communicate across various media formats. (eg. twisted pair, powerline, radio-frequency, fibre, etc.)

Presently during the last few years several groups have initiated efforts to create common networks in the home. From the consumer perspective these are planned standards developed by joint agreement of participating entities. To date, no defacto standard has been developed or been identified as a result of competing concepts in the marketplace.

The home automation efforts in North America which have the strongest support are as follows:

1. CEBUS

- An Electronic Industry Association (EIA) technical standard, or a set of documents.
- A performance standard only, stating how the operation, behaviour and necessary physical characteristics will be established. This creates a multimedia communications standard for home products and systems via various medias.
- Formed in 1984

2. SMART HOUSE

- A propriety electrical wiring and gas plumbing system designed by the Smart House Limited Partnership to distribute and control energy and communication house-wide
- Provides an integrated, pre-designed wiring and control system to be installed by trained Smart House representatives.
- Targeted towards new housing
- Formed early 1987.

3. ECHELON

- Established as a general purpose network technology (local operating network) to enable communication across different market areas.
(car ↔ house ↔ airplane ↔ buildings)
- Though network topology is not specified it is similar to Cebus through media support such as twisted pair, powerline, coaxial, etc.
- Based on the neuron chip.
- Formed 1988.

4. X-10

- A proprietary powerline carrier and radio-frequency encoded transmission standard for communications and control house-wide.
- Oldest and most common group in home automation.
- Retrofittable.
- Simple communication and control capabilities.
- Founded 1978.

From an industry point of view, all these views are different in their business approach to technical, business and market strategies. Basically, they all orient themselves to the common goal of creating a network for product communications in the home.

In the design of the "Home Electronic Bus" it was felt that a network infrastructure based upon the media requirements of Cebus, Echelon, and X-10 would be the most favourable. All three make use of the wiring media and low cost design criteria requirements of the project. Smart House, a unique proprietary network wiring system was ruled out.

A survey of available cabling system on the marketplace that met our criteria led us to adopt Brand Rex's Tri-Con Wiring package. This would provide us with the base upon which to initially design the Bus and panels. Tri-Con was tri-media cable package (PLBUS, CXBUS, TPBUS), similar to Smarthouse's speciality cabling system, duplicating it's marketing tenets of a pre-engineered wiring package, ease of installation, and simplicity. (Note: at time of bus design the Smart-Redi package was unavailable to the market.)

Important in the design guidelines is the "Gateway" or "Node 0", where all the inhouse wiring infrastructures and "outside" service networks (hydro, telephone, cablevision), converge. The following design criteria should be met in regards to "Node 0":

- Central house location for wiring convenience and economics.
- All controls, subsystems, and other home systems panels should be located here for the purpose of cross-system communications and routing.
- Environmentally controlled room.
- Secured zone for safety and security reasons.
- All outside service demark or termination point locations.

(Please refer to following diagram for graphical representation of bus design)

IMPLEMENTATION

Preliminary installation was started based on design guidelines as presented in "Home Electronic Bus" preliminary. Guidelines were as follows:

- Tri-Con (PLBUS, CXBUS, TPBUS) and Duo-Con (CXBUS, TPBUS) cable were used as main branch feeder runs to each individual rooms. The amount of main feeds were based on

secondary network requirements in each room. In other words, security device requirements, HVAC requirements, audio/video requirements, powerline circuit requirements, etc. were determined and the amount of main feed branches were calculated.

- Main branch feeds were implemented in a star configuration from "Node 0" to Tri-Con and Due-Con boxes. (Primary Node Termination Points.)
- Secondary circuits were implemented in a star configuration from Primary Node Termination Points utilizing standard twisted pair, powerline, etc. cabling to establish secondary network and device(s) connection in rooms. (eg. security contact point communication pathway to PNTP.)
- At "Node 0" TPBUS, and CXBUS rough-in boxes were installed awaiting creation of proper coaxial and twisted pair headend panels for circuit distribution. The powerline bus was terminated using a standard main breaker panel.
- All powerline telephone and coaxial runs were terminated using established connectors and devices.

After installation, network was fully tested for continuity, interference and ground faults in preparation for device connection.

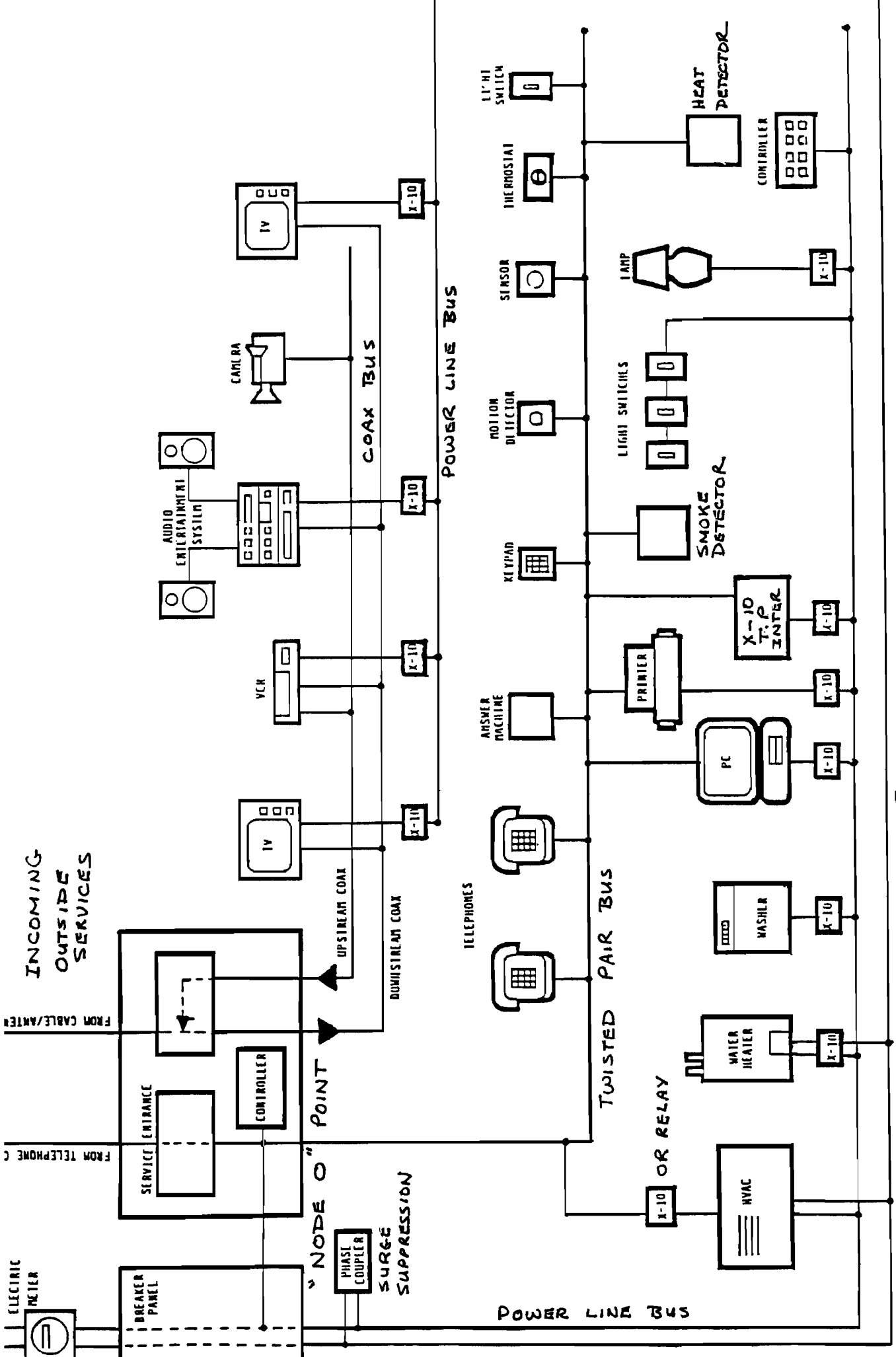
TESTING

One network was implemented tested, then the following procedures were followed to energize Bus and connect devices:

- Cablevision service and telephone service were routed to "Node 0" for future connection.
- All wall receptacles and wall switches designed as powerline control points were installed with X-10 control devices.
- All security devices, fire protection circuits, etc. that require TPBUS for communication were installed.
- Home Automation Inc. model 1503 central whole house controller was installed on "Node 0", implementing control and communications across TPBUS and PLBUS. (At design time there was not a whole house controller that would bridge to CXBUS to

- allow control and communications via that media.)
- Central controller was fully programmed for whole house control implementing the following home automation features:
 - Lighting Control
 - HVAC Control
 - Device Control (eg. washer, dryer, stereo, etc.)
 - Enhanced Security
 - Enhanced Communication (eg. using the telephone in-house or outside to arm security or turn on a light.)
 - Cross-System Communication (eg. using a motion detector to turn on a light.)

After initial energization system was monitored carefully for communication and/or control failures due to device and/or network failures. Upon successfully completing testing and monitoring stages the townhome and complete "electronic bus" was opened for showhome demonstration.



" HOME ELECTRONIC BUS " PRELIMINARY

CONCLUSION

At the time of this report's completion (February 1992), "Telosky Village", the site of the "Home Electronic Bus", had been placed on the marketplace. It was a success and a sell-out.

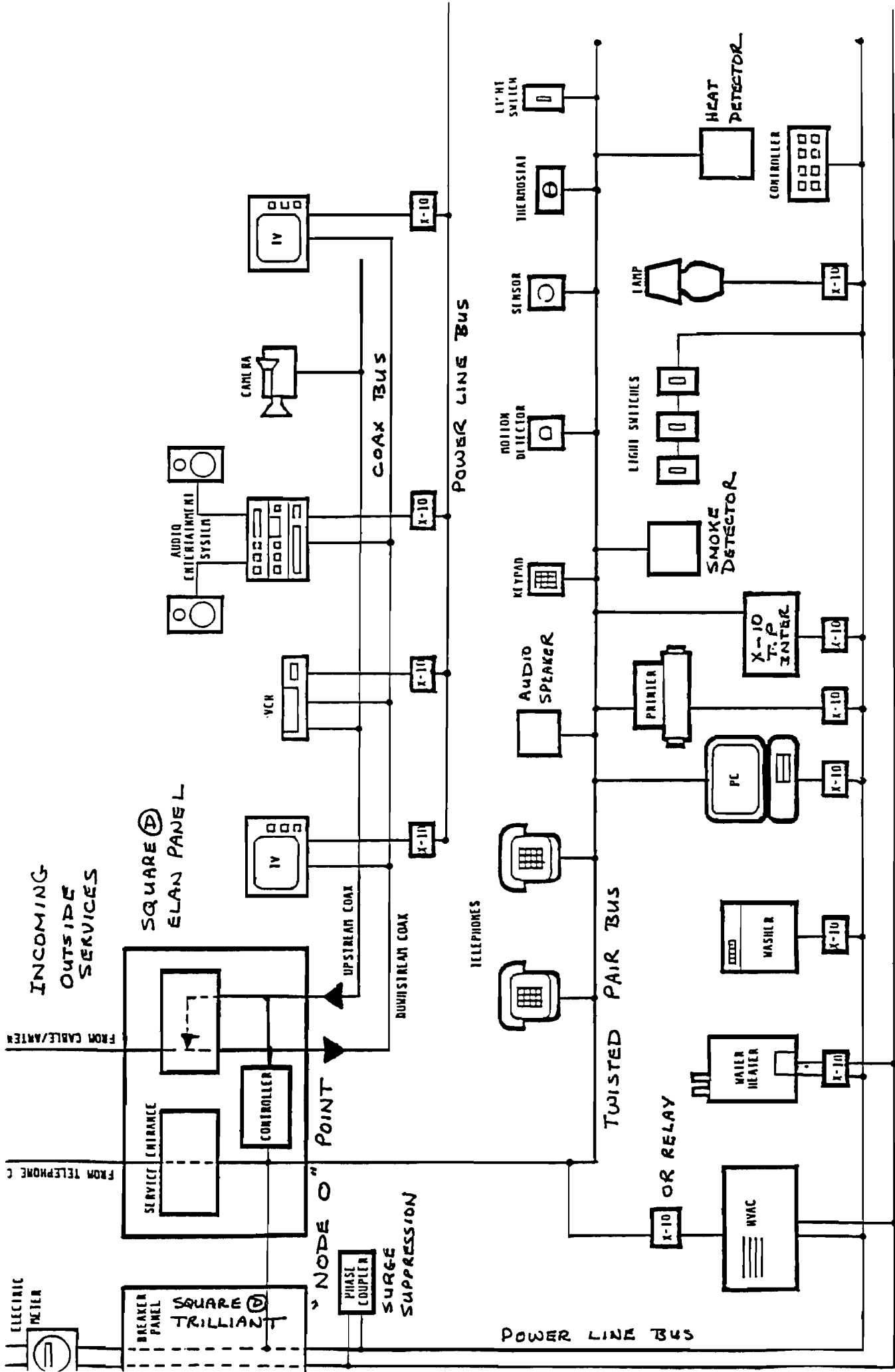
The goals of the project were achieved, and one of the major tenets of providing a wiring infrastructure to the consumer that could adapt to future housing technologies was realized. Along with the above, the project has:

- Received international and local acclaim for its design features.
- Featured in numerous media sources from television to trade magazines worldwide.
- Chosen by AIACE (Italian Home Automation Association) for display in the May 1992 Milan Exhibition as one of the ten most important presentations of advanced housing in the world. This decision was reached on its economically feasible approach to introducing Home Automaton to the marketplace.

Although, our initial project was a success, continuing research with newer products has led us to the following conclusions on bus design:

1. Initial design of the bus utilizing the Tri-Con Cabling System was replaced with more traditional cabling systems. More emphasis was placed on "Node 0" panel design and reorganization of wiring by panel improvements.
2. The Elan Square D Home Electronics System has been adopted to provide the necessary "Node 0" panel improvements. Research is ongoing to modify these panels for Cebus or Lon Networks. See "Home Electronic Bus" diagram for graphical representation of changes and Appendices for further technical information. (Note: Elan has already been utilized in the first North American Cebus demonstration home called, "The Bright Home".
3. Proceed with ongoing work to improve Tri-Con product lines with their company representatives for easier adaptation to the "Home Electronic Bus" design criteria.

In closing, let me make this final statement. Due to the nature of industry the above design, installation techniques, equipment recommendations and installation procedures are provided as an information source only. The result of following the guidelines may or may not provide compatibility with all future technologies. This statement can be justified by the Author's acknowledgement that the design and implementation of a fibre-optic bus was left out of the project, based primarily on economic decisions.



POWER LINE BUS

" HOME ELECTRONIC BUS "

APPENDIX 1
MEDIA COVERAGE

**More space
adds sale**

arts with the Renovators' il of the Canadian Home rs' Association were d recently on the best o enlarge small space - a great renovation if you plan on selling the n the future.

Following are some the red:

Close porches or convert ges into living space.

Use the use of lost space under rs.

Remove unnecessary doors eplace them with sliding cket doors.

Change the swing of a door it opens to the larger m. freeing up space in the aller room.

Remove interior walls if possle. To still achieve some aration, consider a verti-column where the wall od.

Install windows, especially or-to-ceiling bay winws.

In bathrooms, remove the en closet. Even two feet of ore space can mean a lot. o, add a corner vanity to ke better use of space in a all bathroom.

Consider extending the ceilg with a cathedral ceiling d skylight.

Lower the basement to create ore space without croaching on the lot.

Designers also recommend se of light coloured walls floors and strategically d mirrors to give the imion of space in small s.

Innovation professionals the Greater Vancouver e Builders' Association vators' Council must meet n entrance standards and a code of ethical conduct.

**Showroom profiles
Smart-home systems**

A Vancouver company has opened a showroom featuring off-the-shelf equipment that, when combined with new networking technology, may allow smart home-type technology to be retrofitted into older homes.

Smart Lifestyles Inc., in conjunction with Contour Kitchens Limited, opened the showroom in Vancouver's Yaletown warehouse district in November as the city's first interactive display of three intelligent-house packages.

"This showroom itself is an example of how easy it is to retro-fit smart-home systems into a home," said Scott Low, vice-president of Smart Lifestyles.

Visitors to the showroom - which also hosts guided tours for the home building industry three afternoons a week - have an opportunity to try out smart home systems from Elan Advanced Home Network, Home Automation Inc. and Custom Command Inc., three of the leading U.S. smart-home companies. Custom Command's 'Butler-In-A-Box' voice-activated smart systems, designed specifically for retro-fit applications using the Consumer Electric Bus (CEBus) network, is also displayed.

CEBus chip-equipped appliances provide individual intelligence capabilities, instead of relying on a central command computer. The CEBus appliances work in a house wired with standard electrical wiring and cables and would be

suitable for retro-fitting older homes, according to Smart Lifestyles technical director Ron Dewhurst.

The Vancouver showroom also features an Elan touch-screen panel which monitors and controls heating and lighting; a smart video-audio system linked to remote security cameras; and a smart telephone package which doubles as a home intercom.

The Smart Lifestyles showroom, at 1128 Mainland Street, hosts tours for each Tuesday, Wednesday and Thursday.

**MORE CAN
NOW BUY**

Lower mortgage interest rates have opened the housing market for many more buyers.

For example, a family with an annual income of \$60,000 and a gross debt ratio of 30% could afford to purchase a home priced at \$166,067 with the mortgage rate at the current 9%, compared to a home priced at \$133,249 when the mortgage rate was 12%.

A first time buyer, with a family income of \$40,000 per year would pay \$875 per month to purchase a \$84,795 home when the mortgage rate was 12%. At a 9% rate, the same monthly mortgage payment would cover a mortgage of \$105,679.

The above calculations are provided by the Bank of Montreal.

Westwood to host Street of Dreams

British Columbia's first Street of Dreams - produced by the same

Starts lead lots

There have been 5,000 house starts in the GVRD this year, but less than 1,600 new lots have been approved for development, according to a survey by Clayton Research Associates, which is forecasting higher prices for lots next year.

people who have done the Seattle Street of Dreams for eight years - will be held next summer in Coquitlam.

The Street of Dreams will involve seven builders who will showcase a display of large luxury homes in the 1300 acre Westwood Plateau subdivision. The display has been organized by Wesbild Enterprise, Vancouver. It opens next August, for a six week run.

**1000 - A Beach
Condo Valued at \$4**



**St. Paul's Hos
CONDOMINIUM R**

The Real Estate Weekly is proud to link with Vancouver's venerable St. Paul's Hospital for the third condominium raffle. The first two raffles - both featuring False Creek condominiums - were the most successful such charity lotteries in Vancouver's history with more than 16,000 tickets sold.

This one is the biggest and, we believe, the best ever.

The partner is Advance Pacific, developers of 1000 Beach Avenue, and the prize is a stunning, two bedroom, 1,167 sq. ft condominium valued at \$417,000.

The condominium has floor to ceiling windows facing south across False Creek. Features include a fireplace, balcony, in-suite

laundry, seven entry, Euro Italian faucet in the two ba offers exte facilities, privileges.

There are ing from \$2.

Tickets ar 9,900 tickets

PROCEED

All proce dominium l Hospital, V. in 1894, St one of Car teaching at facilities.

CLIP THIS TICKET TO

Lottery license #770244

Your Support Of St. Paul's Hos

Please send me ___ ticket(s) at

**MORTGAGE
RATES?**

See Page 30

TECHNOLOGY

Say Hello to Hal's Star Trek Cousin CEBus

by **Micahael Leader,**
Emmy Award Winning
Sound Engineer and
President of Leader
Sound Technologies

With the promise of energy management, automated lawn sprinklers, multi-room communications, dish washing machines that talk to hot water tanks and clothes dryers, the Smart House Consortium Upper Marlboro MD hope to cash in big by hitting the win button on home automation. However, beyond this proprietary system lies some really big news and developments. Say hello to stark trek cousin Consumer Electronics Bus (CEBus), (pronounced SEABus).

Remember the battle between VHS (Panasonic) and Beta (Sony)? Billions were made, and lost. Has it ever occurred to you that not one...not two, but three electronics giants could get together? It happened! But like the tortoise and the

hare ...this race isn't over yet. CEBus is both a wiring system and digital system protocol which allows various electrical appliances to communicate with each other. However, the development of CEBus, with its open ended architecture along with the support of major power utilities such as Indianapolis Power and Light, Georgia and PSI Energy is destined to become the automation standard worldwide.

Much of the interest in CEBus lies in the fact that, along with its technical sophistication, the control process, like Smart House, will be kids' play, while manufacturers and possibly a few kids will dream up new wonderful intelligent appliances and interfaces/adapters for old ones.

The various methods of controlling your electronic abode with a remote magic wand control include: IR (infra-red); RF (radio frequency); wired key pad on TP (twisted pair); CX (co-Ax cable) or superimposed on PL (AC power

line). Security pass-words are an obvious necessity - just imagine Hal next door attempting to time-share on your telephone system. The robust nature of the entire system protocol (electronic computer language) is actually so simple that users with a casual interest in electronics or computers will be able to install systems as basic as lighting control to a touch screen command centre. If this sounds intimidating, rest assured that all proponents of home automation systems are well aware that over 70% of the world's VCR clocks are flashing "12:00" and that less than 50% of users actually record. The microprocessor, while allowing for an unprecedented degree of choices, functions, and use less wants ...fulfilled (almost), has created the most mind-boggling array of products, which are a challenge for many owners to operate. Manufacturers are cognizant of this and are developing powerful on-board computers, which will simplify all requested functions. Setting the timer on fu-

ture VCR's and operating remote systems will be as simple as 2+2 (base 10) old math.

Safety is often overlooked when discussing exotic systems like these. The Smart House power receptacles, for instance, will not "turn on" if the one-year old decides to stick Mum's bobby pin into the 110-volt socket. House on fire? No problem. Hal shuts off the power, while maintaining emergency lighting, calls the fire department and, if you aren't awake, could turn on your stereo and blast you out of the house with the cannons from Tchaikovsky's 1812 Overture.

For most of us, this appears as a future dream, somewhere beyond the twilight zone. However, variations on the theme are now in daily use throughout the world. One example is the key card programmable locks found in many hotel rooms, elevators and building access card systems limiting access to restricted areas or after-hours entry.

With visionaries like Ron

Dewhurst and Ludo Bertisch playing key roles in the development and application of this new industry, it's rewarding to know that two British Columbia firms are at the forefront. Their success in Bright Home in Indiana is an industry first and recognized achievement. This is not an industry for the uninitiated. There will be lots of hand-holding as various systems evolve. Dedicated professionals such as Bertisch and Dewhurst are in it for the long run. Soon to be introduced is their modular wiring package. The promise from those who support CEBus apart from "controlling your life" is that the cost advantage conventional wiring supplies affords is considerable. Unlike Smart House's "All in One" wiring format (power, Coax and twisted pair which require licensed installers low voltage control wires and Coax video cable may be installed by non-licensed (depending on municipality) personnel or the hand man, during construction or in the future.

High IQ houses win acceptance



The concept of intelligent house systems is becoming a reality in Greater Vancouver as a drive by home builders and independent computer companies merges into smart homes.

A recent example is a single family house on West 63rd Street in Vancouver's Kerrisdale neighbourhood, where a home-grown smart package provides home security, heating and lighting controls from a touch panel.

A joint-venture of Adaptable Housing Ltd. and Smart Lifestyles in conjunction with builder Steadywin Developments of Vancouver, the house is an example of how smart technology can cut fuel bills and add convenience.

From a touch panel located in the lower hallway of the two storey house, the owner will be able to arm the security system, control any or all lights in the house and set the heating levels for various 'zones'.

The Adaptable House system also allows remote control of the system, through the telephone.

For example, the 'vacation' mode on the security system turns selected interior lights on and off in a random order until midnight, to create the impression of movement inside an empty house.

The system has the wiring and necessary control panels in place to upgrade the house to a myriad of other smart controls, such as controlling individual appliances and even the jacuzzi temperature.

Inventors Patrick Simpson and Ron Dewhurst with the intelligent house on West 63rd in Vancouver.

Inset: Touch-panel controls lights, heat, security.

Patrick Simpson of Smart Lifestyles, Vancouver, estimates the smart wiring and control package cost about \$9,000 to install during construction.

"This is a trial for us to show builders how easily intelligence can be wired into a home," Simpson said.

Last year Adaptable Housing Ltd. wired a Maple Ridge townhouse complex with a smart home package that offered the mostly mature residents a package of one-touch home security, heating, lighting and communication controls.

Builders eye Smart House

This year the Canadian Home Builders' Association, in conjunction with Smart House Limited Partnership of the United States, will begin a campaign to introduce Smart House technology to the new housing market. The first step will be the construction of a Smart House in Calgary, Alberta which may act as a prototype of the Canadian standard.

Members of the Greater Vancouver Home Builders' Association will begin a serious study of the concept next month.

Judgin from a recent Atlanta, Georgia, demonstration, it appears Smart House could become widely accepted. From a wall mounted control panel - or even remotely by phone - visitors were able to turn on the gas fireplace, control the stove, program the VCR or even light the gas barbecue on the sundeck. The same panel could also program all heating and ventilation into the home and give instant readouts of how much energy the home, or any appliance, was using.

With the cooperation of 19 manufactur-

Classes House outsmarts its neighbors

various options in
gements, Sept. 30 at
1447 Barclay, from
a. To register, tele-

ad Renewals is the
owners interested in
financing. The class
m 7:30 to 9:30 p.m. at
ommunity Centre.
27-9401.

No. 828 can turn
the lights on or call
if there's a burglar

By ANN BARLING

THE HOUSE AT 828 West 63rd Avenue doesn't display its differences on the outside.

The brick and stucco exterior, wavy tile roof, double oak doors and huge bay window are not markedly different from many other contemporary houses and are almost identical to those of the house next door.

But inside, No. 828 is different.

It's smarter than its neighbors. Step inside the front door and the chandelier in the entrance hall lights up. Walk into the living room and the gas fireplace pops into flame.

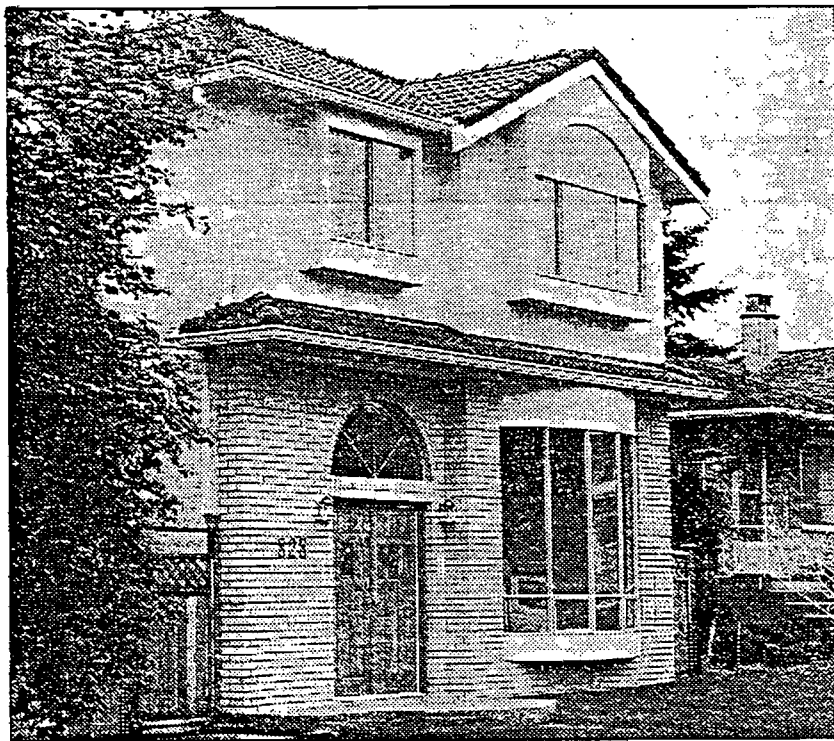
If a burglar breaks in while you're at work, the house will phone you at the office — except when you're at lunch between noon and 1, when it will phone its warning to an appropriate person.

No. 828 is a "smart house" installed with a home automation system. It's the first automated spec house in Vancouver, according to Patrick Simpson, of Smart Lifestyles, the company that installed the system.

The house has been built on spec (for an undetermined buyer) by Stadywin Developments Ltd. and installed with an HAI system, by Home Automations Inc. of the U.S.

The system can be voice-operated through the telephone or by a touch panel on the wall.

To secure the house when you leave for the office, simply push the AWAY button. To dim the lights for



JEFF VINNICK

SMART HOUSE is wired to do everything from regulating the furnace to turning on the fireplace

a romantic dinner, just touch a button. You want all the energy savers on when you leave on vacation? Touch a button.

At bedtime, one button will turn off all the lights except the upper hall, where they stay on for 30 pre-bedtime minutes. Another button will set the energy savers for the night and move the house into its "security in sleep" mode.

The house is now set for display purposes with the system operating mainly to turn the lights and the gas fires on and off automatically. But it can also be programmed to start and stop the lawn sprinklers at appropriate times, to flash the exterior lights

and set off the alarm if there's a break-in, or phone for repairs if the furnace goes on the blink during a cold spell while you're sunning in Hawaii.

Simpson describes HAI as a basic system that is "probably the best value for the money because of what it can do." It costs \$7,000, installed.

The heart of the system is contained in two small wall boxes, which could run a house up to 12,000 square feet in size, says Simpson.

The 2,178-square-foot, four-bedroom house at No. 828 is selling for \$499,000. The house, and its home automation system, are on display weekends from 2 to 4 p.m.

's
Views

OF LIVING

Quay you really

the sun-swept

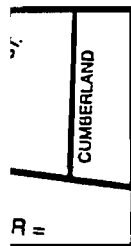
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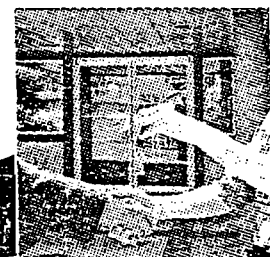
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Telosky Village: modern townhouses adaptable to the entire community

Telosky Village:

Adaptable to
Accessibility.

WHEN YOU WALK into one of the 47 townhouses at Telosky Village, a new development in Vancouver, British Columbia, the differences aren't immediately noticeable: the doorways and hallways are slightly wider, the light switches are lower, there is a large storage area in some units, and other details are slightly different from the garden variety townhouse. These differences are due to the builders using new philosophy, the philosophy of adaptable housing.

Adaptable housing is meant to be an alternative, for the disabled and the elderly, to accessible housing. Accessible housing is designed specifically for this group. Adaptable housing is built so it can be used by either the disabled population or the general population.

Often, if a disabled person wants to live in non-accessible housing, expensive retrofit installations are needed to accommodate their special needs. Walls need to be reinforced for grab-bars, and light switches and cabinetry lowered; this could just be a start, depending on the severity of the person's disability. But if a house or, in this case, a townhouse is built using adaptable housing guidelines, this type of work is foreseen and easily accomplished.

Telosky Village was built using this philosophy by Hollyglen Holdings, Ltd., in conjunction with Adaptable Housing Ltd., a consulting group formed by Ron Dewhurst of Maple Ridge Compuhome and Patrick Simpson, a vice president at Hollyglen. Adaptable Housing was formed when the

two friends saw that they could combine their expertise in advanced electronics for the home and real estate development to create this new idea in housing.

Ironically, the single feature that makes the Telosky Village townhouses most flexible isn't noticeable at all in an unconverted apartment. That is because this feature is a unique wiring scheme that allows installation of a home automation or security system to be easily accomplished.

The special wiring scheme features a single cable which includes the television cable, copper-sheathed electrical wiring and the security wiring to each apartment. This wiring scheme was approved for Telosky Village under a pilot program. It allows residents to easily upgrade their house's electrical system and install such options as a touchscreen-controlled or voice-controlled home automation system, an interior security system, or a whole house Audio/Video system. These are seen as options that will attract almost any buyer, but will be of added importance to the disabled.

The philosophy of adaptability also makes other additions possible, ones which are needed only by the disabled. For instance, walls and shower stalls are reinforced for the possible installation of grab-bars. There is even an elevator shaft built into all the second floor units, so that an elevator can be installed if needed, at a cost of about \$1,400. If it is not needed, it can be used as large storage space.

Adaptability is advantageous to several groups of people. For the disabled, it means

a wider choice of housing plus the opportunity to live in an independent manner in a community where they are members of the general community, not isolated by themselves. For builders, it opens their projects to the large disabled population without abandoning the general populace, while offering several unique benefits all buyers will appreciate. For those buying homes for retirement, it means their homes will easily be able to handle most physical challenges that may occur in their older years. For those who work at home, the built-in computer station makes an excellent base for a home office. And for any home buyer, it means if they ever do develop a temporary or permanent disability, their housing will be able to meet their needs.

While this type of design is somewhat more costly than a standard design, the advantages it offers should make its implementation worth the extra cost. If it is implemented on a wide scale basis, it will give the disabled and elderly the same variety of choice in housing as the general populace enjoys. The developers of Telosky Village feel that the disabled should have this choice, just as they have a right to accessibility in public buildings. ■

THE NEWS Homes

Pair pushes 'smart' homes

The age of the Jetsons has arrived. Although Ron Dewhurst and Patrick Simpson don't exactly look like George and Jane, they are the wizards behind "smart homes" — houses designed to run on automation systems.

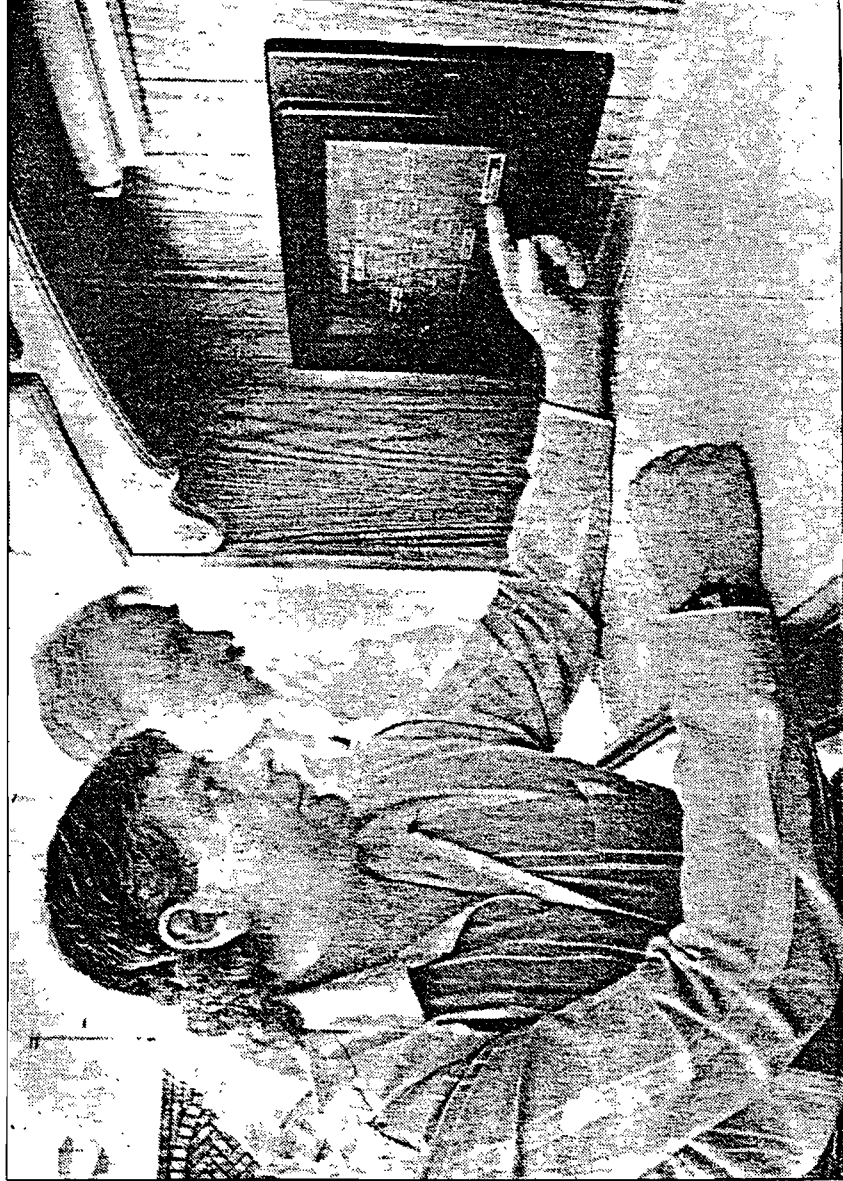
**By Jina You
Staff Reporter**

The two had been friends for years when they decided that their different interests could be put to use. Dewhurst had nine years of computer experience from various electronic trades while Simpson had about 12 years of background in real estate development.

Together, the Maple Ridge-based pair formed a company last August called Adaptable Housing Ltd., which distributes home automation products to developers and builders in B.C. They also act as consultants in the field of home automation.

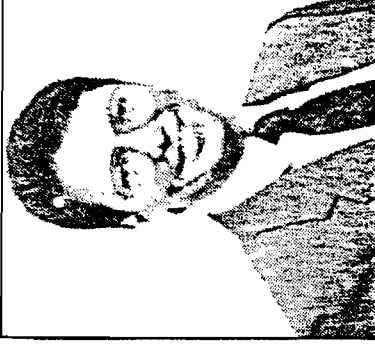
"We formed the company to address two basic needs: The coming age of home automation and the impact of technology on

Continued on page A-27



Ron Dewhurst (left) and Patrick Simpson of Adaptable Housing Ltd. try out the computer screen that helps control one of their "smart" homes in Maple Ridge. NEWS Photo by Aileen Reddekop

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SMART HOMES

SMART HOMES

Continued from page A-26
 all facets of housing design," Dewhurst said.

Dewhurst had a hobby interest in robotics that he believed was directly related to home automation. "I started to think how robotics could help handicapped people," he said, "and, as we developed more and more into home automation, we realized that it was going to be the future in terms of saving energy and being safely-conscious."

"There is a symbiotic relationship between man and machine," Dewhurst continued. "A machine can act as an extension of the brain."

Automated houses have become popular in Japan and Europe and are just beginning to catch on in the United States and Canada. Adaptable Housing is the first company in Canada to build a completely automatic home.

The principle behind automatic houses is simple: A pre-wired system is connected to a main central computer terminal that can be programmed to provide room-by-room temperature and security control and to control a home's lighting and appliances.

The system uses a sophisticated computer and a wall-mounted touchscreen that displays each home's unique floor-plan and enables homeowners to set up the

home's actions to complement their lifestyle.

The system can be operated in a variety of ways and use motion detectors, pressure sensors and timers. All allow a hands-free approach to controlling the home environment.

"Its applications are limitless," said Dewhurst. "For example, you could program your house to turn down the heat before you go to bed and raise it one hour before you get up — the amount of energy saved is amazing."

As well, automated homes will be of particular interest to those with limited physical capabilities, such as paraplegics or the elderly.

For instance, the computer can be programmed to turn on lights when the phrase "turn on the lights" is uttered, or when a certain section of the room is crossed.

A robotic work cell that makes use of a robotic arm and a computer controller can also be connected to the automation system for the physically disabled.

Dewhurst and Simpson have recently completed work on their first automated house in Maple Ridge and have begun planning for a complete automatic town-house development called Telosky Village. The complex will consist of 43 units and is expected to be completed by the end of this year.

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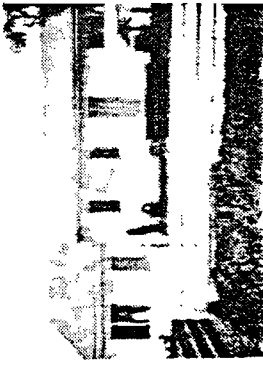
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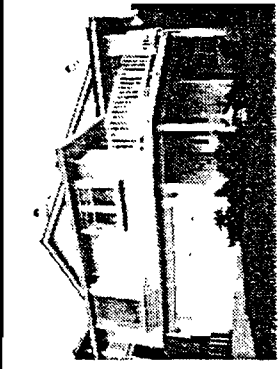
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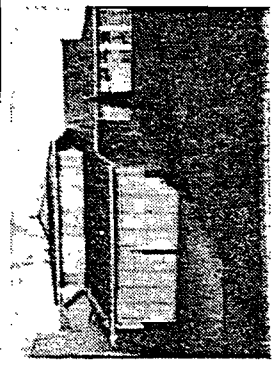
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PARAGRAPHIC

VOLUME 32, NO. 4
SPRING, 1990

QUARTERLY JOURNAL OF THE CANADIAN PARAPLEGIC ASSOCIATION (B.C. DIVISION)

Telosky Village – Housing That's "Adaptable"

TELOSKY VILLAGE is a 47-unit, townhouse project with a difference. Instead of simply providing accessible housing, the focus has been on adaptable housing. The plan was to design certain features that can be modified or removed to suit the occupant's needs.

The project, currently under construction in Maple Ridge, hinges on accessible housing which does not appear different from other designs. This is a concept that could increase availability of other attractive and universally usable housing in all sizes and price ranges.

This design also benefits both providers and consumers of housing. Developers, owners and managers of family housing will benefit when they build under the "adaptable" guidelines for the following reasons:

- the "adaptable" design concept is marketable to a broader population base.
- because the "adaptable" design *does not* appear different, it also appeals to a wider consumer market.
- lower cost and ease of adaptability compared to retrofit costs of traditional design approaches.
- a pre-wire design which allows the units to take advantage of modern security, fire, electronics and home automation systems, if desired.
- a computer station incorporated into the design allows for natural integration of all related technologies into modern housing concepts.



Artist's conception of Telosky Village

Hollyglen Holdings Ltd. is creating the development in consultation with Adaptable Housing Ltd., a real estate consulting and developing company dedicated to bringing new concepts in housing to the marketplace. Adaptable Housing Ltd. was founded in August, 1989 by Ronald B. Dewhurst, President of Maple Ridge Compuhome, and Patrick Simpson, Vice-President of Hollyglen Holdings Ltd. Combining years of experience in real estate development, computer technology and electronics, Adaptable Housing Ltd. design standards will respond to the various needs of all people within their living environment.

In conjunction with other progressive and motivated companies, Adaptable Housing Ltd. seeks to integrate existing technologies in order to create a new vision of housing. Voice-command home automation systems for the disabled, medical alert systems for the elderly or convalescent and computer workstations for young execu-

tives are some examples of the kind of demand that exists in the housing market today – Adaptable Housing Ltd. will satisfy these requirements, and more.

Venture capital for Telosky Village will be provided by Hollyglen Hold-

cont. on page 13

INSIDE

From the Valley:
Mark Stenburg looks
at one member's
answer to R.V. travel
for the disabled,
Page 9

REAL ESTATE WEEKLY

COQUITLAM/PORIT COQUITLAM/PORIT MOODY (Includes Maple Ridge listings)



Volume 5, Number 30 Ely Publications Ltd. / 3355 Grandview Hwy., Vancouver V5M 1Z5 435-7977 Home Delivery: 439-2626 Friday August 3, 1990

Disabled meet on barrier free housing

Often the disabled are forgotten in the plans for both new market housing and commercial buildings, according to the B.C. Coalition of People with Disabilities.

To help improve the situation, the Coalition is mounting a one day conference next month in Vancouver featuring how-to workshops on renovations and design for accessible housing.

The conference costs \$50, which includes lunch and a post-conference reception. It will be held August 29 at the downtown Harbour Centre campus of Simon Fraser University, Vancouver. To register call the B.C. Coalition of People with Disabilities, Plan A Access Resource Centre, at 875-0188.

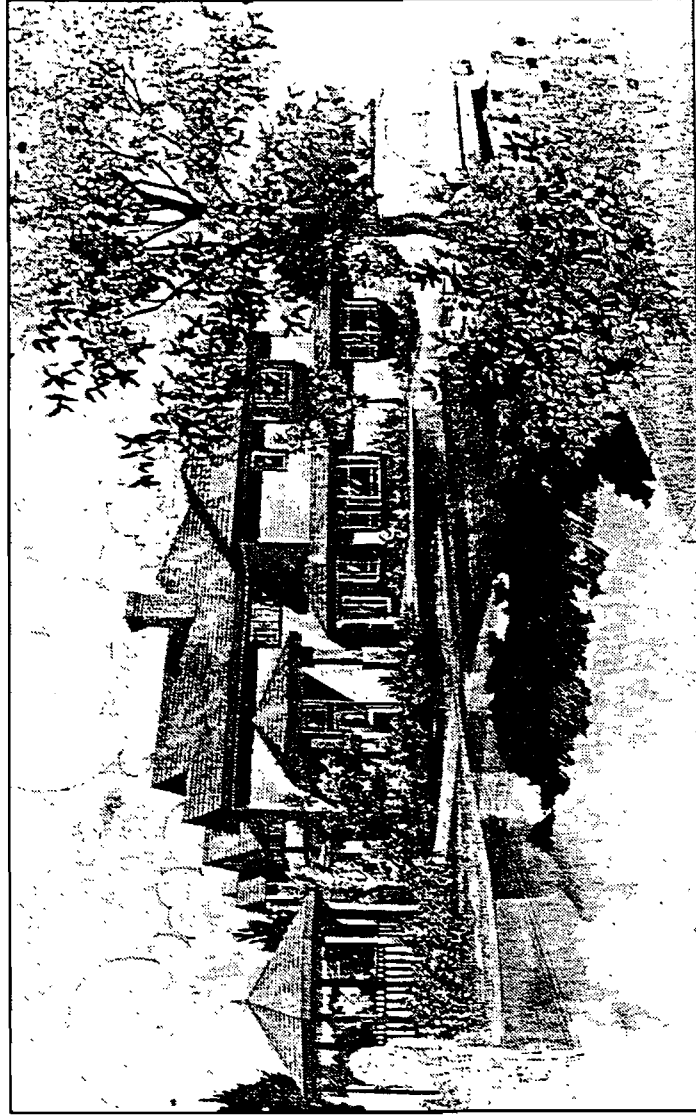
Designed for the disabled, seniors

A new townhouse development in Maple Ridge has been designed to not only be accessible to the handicapped and seniors but also offers a pre-wired computerized option package that makes the homes super intelligent.

Telosky Village, by Holtylen Holdings Ltd. of Vancouver in conjunction with Adaptable Housing Ltd., removes many of the barriers which disabled persons find in conventional condominiums. Each of the planned 47 units in the complex are on one level, they have level entrances, wider hallways and foyers and other innovations to allow easy wheelchair access.

According to a study by Canada Mortgage and Housing Corp., many seniors buy their retirement home while they are in good health but later develop handicaps which may make the

New condos pre-wired for the future



Telosky Village in Maple Ridge - condos and townhouses designed for disabled and seniors but built to look like conventional homes. The Village is also pre-wired for a super smart computerized control package. A grand opening is set for August 4 at 1 p.m. at 11502 Burnett Street.

buildings, is clad in cedar siding

A single coaxial cable - ap- electronic smart package has

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handicaps which may make the home unsuitable.

"In each of the kitchens, the counter tops and sinks can be easily lowered to accommodate wheelchairs," explained Patrick Simpson, vice-president of Honeywell Systems security package, part of a complex wide innovative single wiring network that allows owners to increase the intelligence of their home.

A single coaxial cable - approved at Telosky Village under a pilot program - combines cable television, copper

single family houses.

The accessibility features of Telosky Villages were designed following input from the Canadian Paraplegic Association, B.C. Division, Patrick Simpson explained.

For second floor suites Telosky Village provides an optional \$14,000 elevator, the shaft of which doubles as a large storage area if the elevator is not installed.

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The Telosky Village units, ranging in size from 1,285 sq. ft. to 2,500 sq. ft. (including 1,100 sq. ft. basement), are priced from \$139,900 to \$299,000. Honeywell is fully cooperating with local real estate professionals in the marketing of the Village.

WIN A LUXURY FALSE CREEK CONDOMINIUM FOR \$100! Draw Date: Oct. 26, 1990

The Real Estate Weekly, in conjunction with St. Paul's Hospital Foundation presents a raffle to win a luxury two bedroom condominium in Pacific Cove, a PCI Group development on False Creek. Tickets are \$100.00 - only 8,000 are available. For details, call 631-5355.

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Judges start search for best BC housing

The fourth annual British Columbia Housing Awards are underway and judges will soon be poring over an expected record of applications to choose the best housing in the province.

The Housing Awards are sponsored by the Canadian Home Builders' Association of B.C. and the provincial government which present awards for new single family and multiple family housing, plus recognition of the best residential renovation projects.

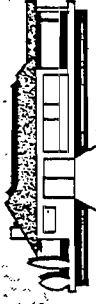
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Interested builders are requested to contact the CHBA-BC at 432-7112 for details and application forms.

REAL ESTATE WEEKLY

BURNABY EDITION (includes New Westminster Listings)



Volume 10, Number 30 Elty Publications Ltd./3355 Grandview Hwy., Vancouver V5M 1Z6 435-7977 Home Delivery: 439-2626 Friday, August 3, 1990

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New condos pre-wired for the future

Single cable carries: TV, power, security

A new townhouse development in Maple Ridge, designed to be accessible to the handicapped and seniors, also offers a unique pre-wired computerized option package that makes the homes super intelligent.

Telosky Village, by Holtylen Holdings Ltd. of Vancouver in conjunction with Adaptable Housing Ltd., removes many of the barriers which disabled persons find in conventional condominiums. Each of the planned 45 units in the complex are on one level, they have level entrances, wider hallways and foyers and other innovations to allow easy wheelchair access.

According to a study by Canada Mortgage and Housing Corp., many seniors buy their retirement home while they are



Patrick Simpson with single coaxial cable that combines cable TV, hydro and security in a new Maple Ridge townhome development. It is the first use of the cable in B.C.

and roofed with treated cedar sheathed electrical wiring and Systems Ltd., a subsidiary of

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homes are characteristic of large single family houses.

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Smart Options

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Adaptable Housing Ltd.

The first phase of Telosky Village - 18 units - is now under construction, with a sales office on site. The grand opening, August 4, from 1 p.m. to 5 p.m., will feature displays of the optional smart home technology. The Village is located at 11502 Burnett Street, Maple Ridge (between Lougheed Hwy. and the Haney By-pass).

The marketing of the Village.

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New Homes

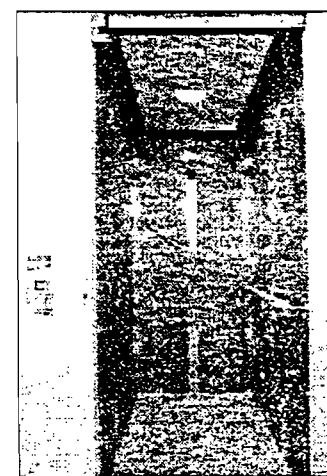
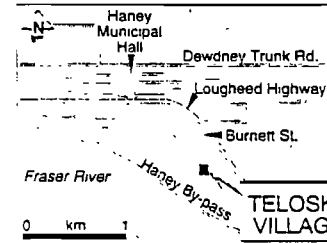
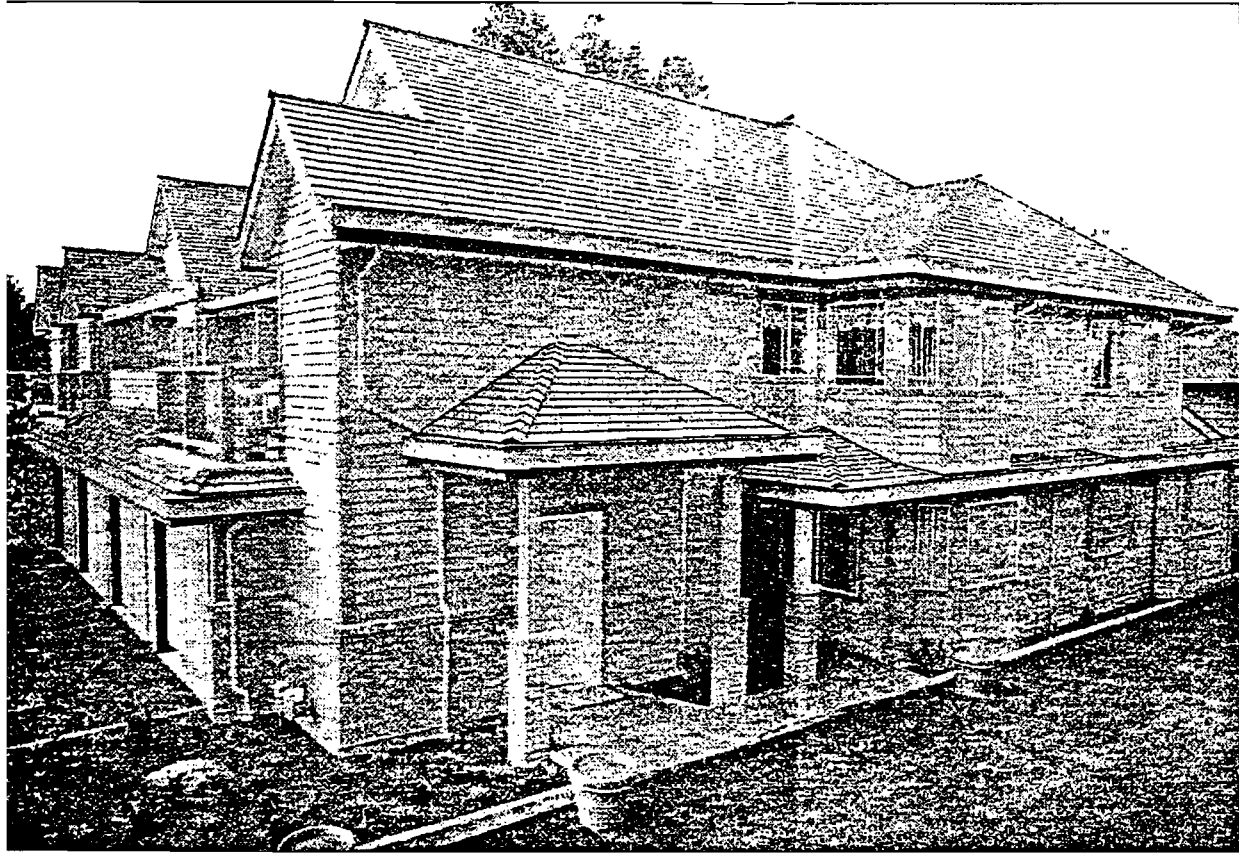
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E VANCOUVER SUN

Friday, August 17, 1990

SECTION



ELEVATOR in the upper level display unit may be installed as an optional feature

LOSKEY VILLAGE: designed to look like ordinary townhouses but built to be easily adaptable

Adept at adapting

they may appear ordinary from the outside but these townhouses have a special touch of versatility

ANN BARLING
New Homes Editor

WALK INTO the townhouses in Telosky Village and it's likely you won't at first notice anything unusual about the units. They have two bedrooms, two bathrooms, a kitchen with a breakfast nook and spacious living and dining rooms.

They are designed to look like ordinary townhouses. The difference is that they are adaptable. The walls and doorways are wider than usual, to take a wheelchair if required. A hollow cabinet in the kitchen can be removed and the sink lowered to make it wheelchair accessible. An extra electrical outlet is at counter level.

In the master bathroom, walls are reinforced to take grab bars. The shower has an equal pressure valve to prevent a bather being unexpectedly scalded or doused with cold water. There are bars on the bathtub and even the taps have easy-to-turn handles.

Inside the front door of the stairs units an elevator shaft is all ready for an optional lift to be installed, if required. If not, the

owner has an extra two floors' worth of storage space.

The Telosky townhouses are also wired to accept a complete home automation system that would allow owners to turn their homes into "smart" houses.

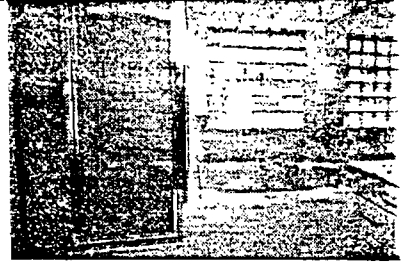
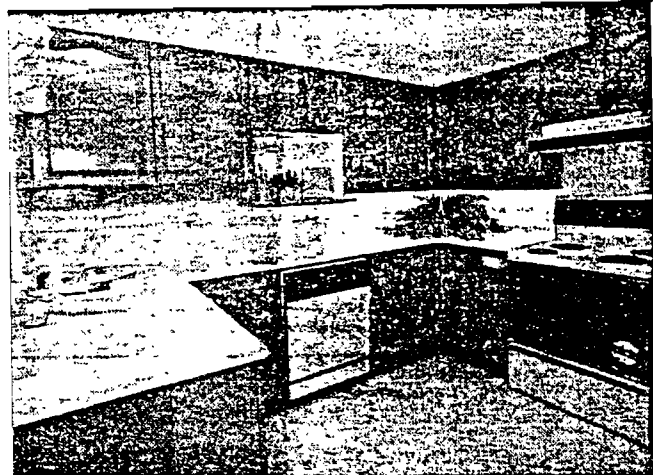
"We realized that the Smart House concept worked beautifully with adaptable housing," says Patrick Simpson, vice-president of Hollyglen Holdings Ltd., developer of Telosky Village.

Owners may upgrade their systems as required, adding anything from voice command, medical alert, safety or security features. "If you want, it will open and close the curtains when the sun rises and sets, or turn the fireplace on when you enter a room," says Simpson.

The townhouses are suitable for a mixed group of people, said Simpson, whether "yuppies who like to add a home automation system to their toys," or the disabled who require its voice-operated abilities.

"Each townhouse would adapt to that person's lifestyle," said Simpson. "The cost of adapting is minimal. If you move out the unit can go back to what it was before."

Telosky Village is located at 11502



WALLS in the en suite bathroom, above are reinforced to take grab bars. Kitchen sink, left, can be easily lowered; electrical outlet is at counter level

Burnett, about two blocks from downtown Maple Ridge.

The 43 townhouses range from \$139,900 for a unit of 1,233 square feet with crawl space to \$209,900 for the 1,542-square-foot A unit, which also has a 1,154-square-foot ground-level basement and a 400-square-foot cellar.

"Add everything together (in the A unit) and you end up with close to 3,100-square-feet of townhouse," says Simpson.

Designed by architect Ron Hoff-

art of Maple Ridge, six of the seven floor plans have been included in the first group of six townhouses to be built on the site, situated on a hill looking south to Fort Langley.

Built by GPS Construction Corp. of Burnaby, the townhouses have mushroom-colored cedar siding, treated cedar shingle roofs and hidden gutters.

About half of the townhouses have basements and most have a cold storage area, useful for preserves or wine. Two units have been furnished

as display suites and an elevator has been installed in the upper level display townhouse.

A hallway in each unit is designed to take a computer station for those who opt to have the home automation centre. If this is not required, the four-foot by six-foot space could be put to good use as a small sewing area, or closed off with doors to provide an extra closet.

Other features include motion, heat and smoke detectors. Staircases are reinforced to take a side-

lift, if needed.

"What you are paying for is the quality going into the walls," says Simpson. "You are not paying for making it adaptable," or the cost of home automation wiring.

Adaptable Housing Ltd., Simpson's company, acted as consultant for the project.

"In the past, adaptable housing has just been for the handicapped," said Simpson.

The Telosky Village townhouses are for anyone.

Mould an everything-looks-alike condo to your own style

By LORI KNOWLES
London Free Press

CONDO LIVING. It's synonymous with easy street.

Someone else cuts the grass, repairs the driveway, trims the shrubs. All you do is toss a T-bone on the barbecue, select a CD and put your feet up.

There's only one problem: esthetics.

Every condominium in a complex looks the same, both inside and out. Well, not every one. Peter and Georgie Zendrowski found a way to beat those everything-looks-alike condo blahs.

Three years ago, they bought a \$200,000 unit at Windermere Estates in London, Ont. They abandoned their independent home for the easy life, but feared losing their personal style.

Buying the condo before it was built meant the field was wide open for plan changes.

"If you can get to them before the ground is dug," says Georgie Zendrowski, "you can change just about anything."

The couple scrutinized the developer's standard blueprints and concluded some



MICHAEL JORDAN/NOON FREE PRESS

GEORGIE ZENDROWSKI in her redesigned kitchen in which a wall was eliminated

spaces needed "opening up." They approached the builder with an altered plan, met little resistance, and set to work.

Three years later, the Zendrowskis' condo leaves its own impression. Walls are gone in the kitchen and stairwell, corners

are angled in the bathroom for a softer impression and a new deck wraps around the back end of the house. The inside look is drastically different.

"There's rarely any problem with these types of changes," says Deborah Nash of the

Matthews Group, the developers of Windermere Estates. "If you apply early enough, you'll get what you want."

The Zendrowskis say the alterations added about \$1,000 to the final bill. Georgie says they'd be charged extra for an added wall in one place, but given a discount for removing one in another.

(Some Vancouver developers say they could make interior changes for owners who buy before construction, but others point out that allowing individual design alterations would make it very difficult to keep to production schedules.)

Arranging for the condo walls to come down once they're up isn't so easy.

Mark Freedman, a lawyer and member of the Canadian Condominium Institute, says most associations prohibit changes to existing structural walls.

Condo owners are free to renovate and decorate as long as they don't touch load-bearing walls, he said. In most cases, outside walls or arches can't be moved, holes made, or balconies enclosed.

Exterior alteration isn't easy, either.

Complexes strive for an image and usually balk at individualism. Additions rarely the go-ahead. Associations are often reticent, though, to patio and deck revisions.

The philosophy is simple. Condo owners own only what's on the inside of structural walls. Everything else, known as common elements, belongs to the condominium complex as a whole.

(B.C.'s Condominium Act states that alterations to the exterior or the structure require written permission from the strata council, the governing body. Strata corporations also often make their own bylaws limit renovations.)

Potential condo buyers should be aware of renovation limitations before they chase, warns Brian Blacklock, a spokesman for the Ontario consumer ministry.

Georgie Zendrowski says there's no personal style permitted to keep happy.

"We were a little afraid of it at first—idea of being so close to somebody else's having to share your grounds. But I it."

REAL ESTATE WEEK

New Homes
See Contents



LANGLEY EDITION

Volume 6, Number 5 Elty Publications Ltd. / 3355 Grandview Hwy., Vancouver V5M 1Z5 435-7977 Home Delivery 439-2626 Friday, February 8, 1991

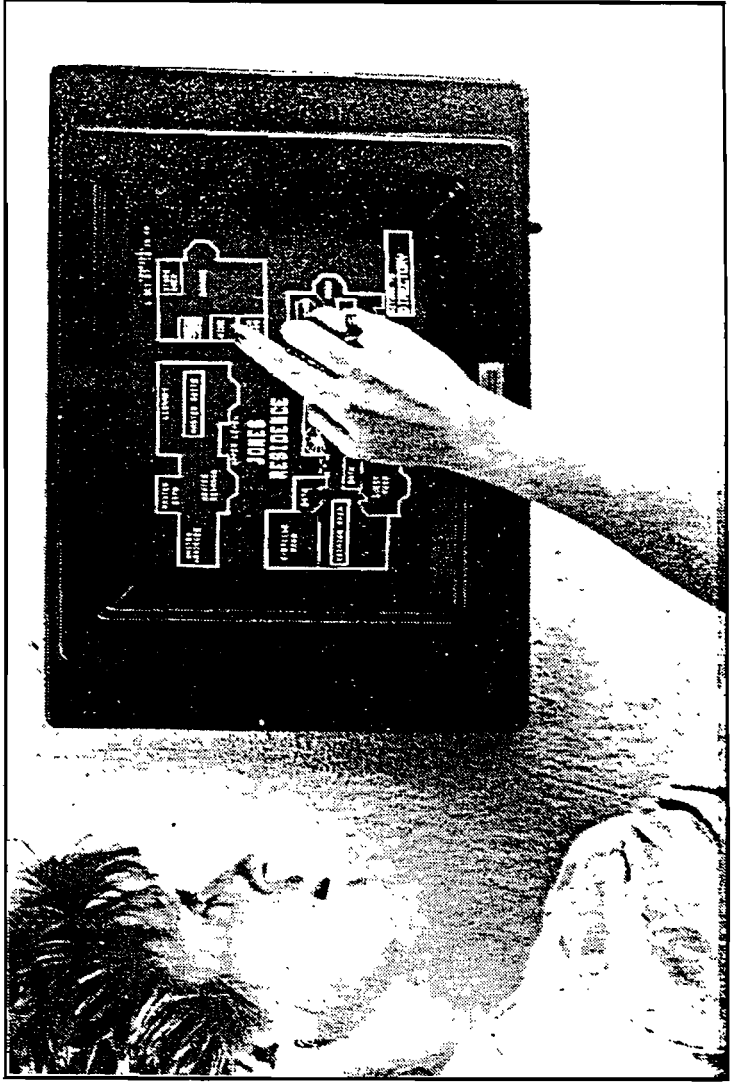
'Smart House' on threshold of acceptance

Advanced technology promises to usher Smart Houses into the mainstream of housing after nearly a decade of false starts.

The latest Smart House was unveiled last week in Atlanta, Ga. during the annual convention of the National Home Builders' Association. According to a high powered, hands-on display, the new technology will be available within two years to every home owner that wants it.

And, say the U.S. home builder, it is now as easy to increase the IQ of an existing house as it is to build a Smart House from scratch.

The Atlanta display was impressive. From a wall mounted control panel - or even remotely by phone - visitors were able to turn on the gas fireplace, control the stove, program the VCR or even light the gas barbecue on the sundeck. The same panel could also program



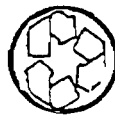
Smart house system, such as the Unity software package above, control heating, cooling, security systems, lights and appliances from a single touch screen.



Fraser Valley
Real Estate Board

Environmental Tip Of the Week

Remember to avoid putting paper with any glue on it in with recyclable paper.



(GVRD Recycling
Hotline, 736-8366)

RE Board concerned about environment

With concern about the environment, the Fraser Valley Real Estate Board has issued a series of public

numero fax / fax number:

001.604.3226958



Foglio di trasmissione FAX/FAX / FAX TRANSMISSION

MITTENTE/FROM: Associazione Italiana per
l'Automazione nelle Costruzioni

President secretary

DATA: 18/12/91

DESTINATARIO/TO: SMART LIFESTILES

ATTENZIONE/ATTENTION: Patrick Simpson

PAGINE/PAGES: 1

MESSAGGIO/MESSAGE Dear Mr. Simpson,
as our president Mr Travi already told you, from the 7th to the
11th of May 1992 we will have here in Milan an exhibition
concerning houses of the future. This exhibition will be sponsored
together by AIACE and Milan Fair. We will show projects and
videos of the most important houses (no more than 10) and will be
glad to show also Telosky Village. There will be videos always
running and big panels on the walls showing data and pictures.
For this exhibition we need a video of 10 - 20 minuts showing the
realization in general and the special features in it (it is not
important if the video is a professional one or not).
For pictures, we can use some of those taken by Mr. Travi during
his visit last November.
We need also a brief description of the technical plants inside one
house (no more than 60 lines).
Please, let us know if you are interested in this proposal.
You can send mail directly to Valerio Travi Architetto- AIACE
PRESIDENT SECRETARY - Via Canonica 59 - 20154 Milano - Italy
Best regards

AIACE secretary

APPENDIX 2

TRI-CON PATENT - DESCRIPTION

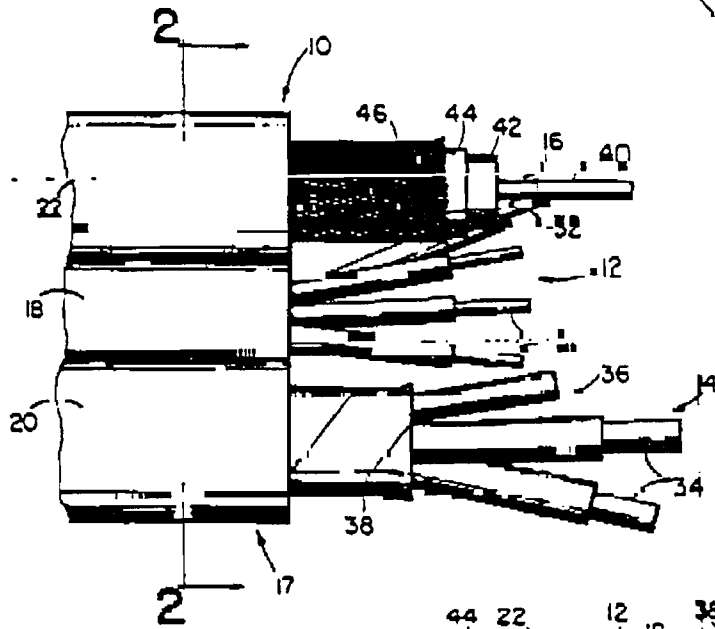


FIG. 1

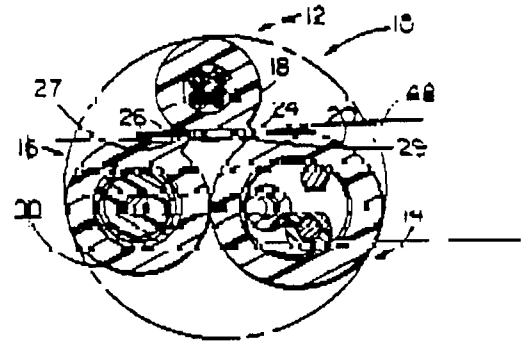


FIG. 3

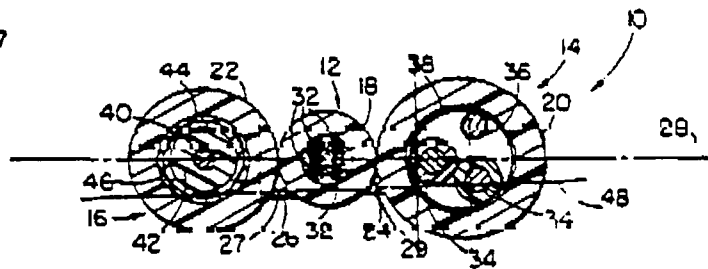


FIG. 2

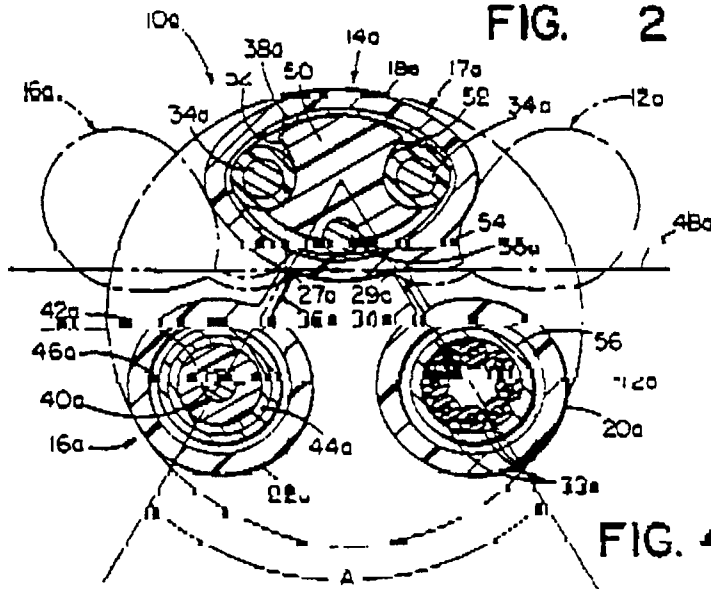
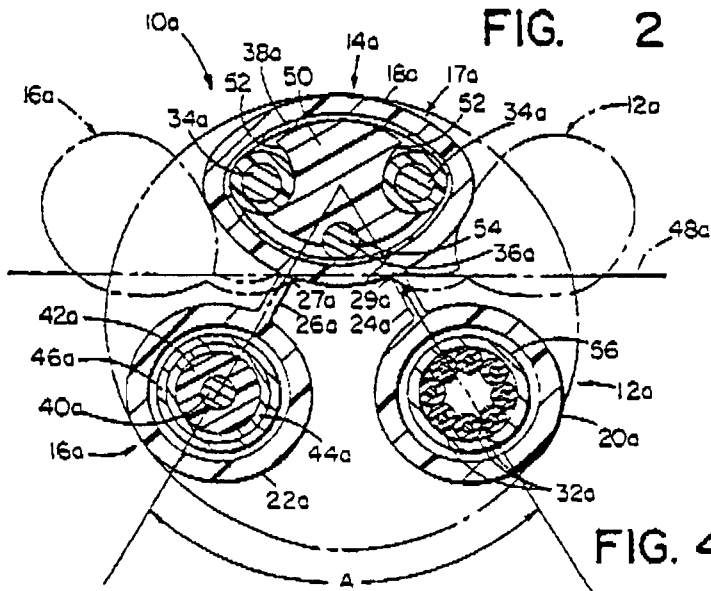
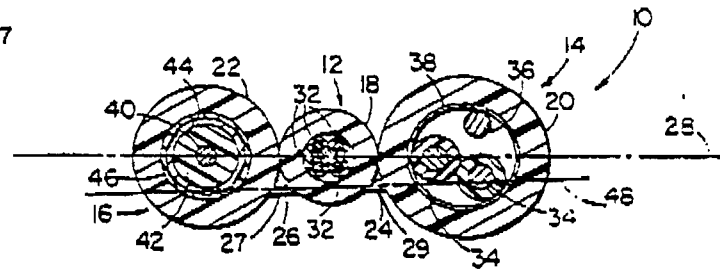
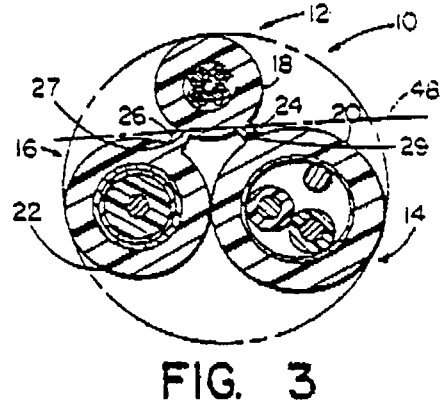
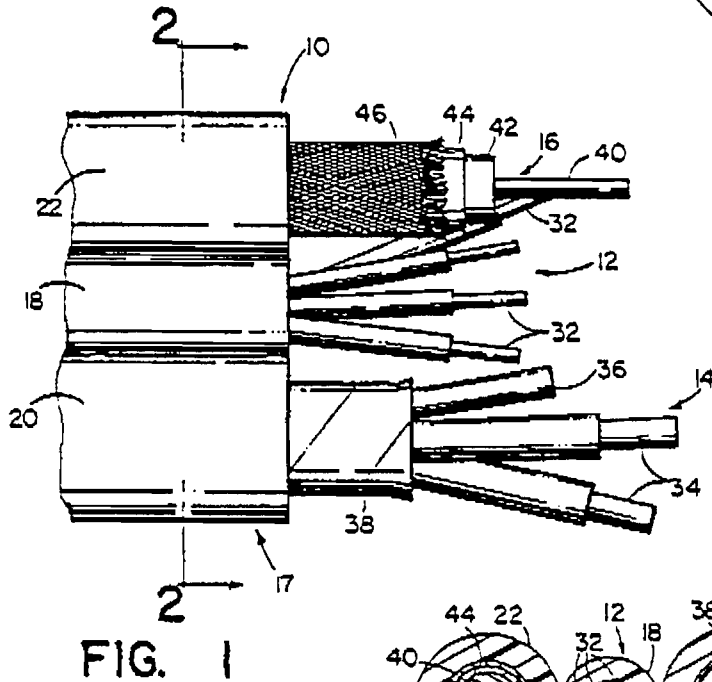


FIG. 4



United States Patent [19]

Johnston et al.

[11] Patent Number: 4,533,790

[45] Date of Patent: Aug. 6, 1985

- [54] ELECTRICAL CONDUCTOR ASSEMBLY
[75] Inventors: James J. Johnston, Old Saybrook;
Gregory L. Glynn, Mansfield Center,
both of Conn.
[73] Assignee: Akzona Incorporated, Asheville, N.C.
[21] Appl. No.: 589,169
[22] Filed: Mar. 13, 1984

Related U.S. Application Data

- [63] Continuation-in-part of Ser. No. 466,833, Feb. 16, 1983,
abandoned.
[51] Int. Cl.³ H01B 7/00
[52] U.S. Cl. 174/115; 174/36;
174/117 R
[58] Field of Search 174/36, 115, 116, 117 R,
174/117 F, 113 C, 131 A

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Primary Examiner—A. T. Grimley
Assistant Examiner—Morris H. Nimmo
Attorney, Agent, or Firm—McCormick, Paulding &
Huber

[57] ABSTRACT

A flexible free-stripping composite cable assembly having a plurality of groups of electrical conductors including power supply, telephone and CATV/DATA conductors. Each group of conductors is contained within a distinct portion of a common insulation jacket. The jacket portions are connected by integral webs for hinged flexure relative to each other to facilitate alteration of the cross-sectional configuration of the cable assembly. The power supply conductors are separated by a dielectric spacer and surrounded by a flexible metallic shield which is in electrical contact with an uninsulated one of the power supply conductor throughout a substantial portion of its length.

17 Claims, 4 Drawing Figures



ELECTRICAL CONDUCTOR ASSEMBLY

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of application Ser. No. 466,833, filed Feb. 16, 1983, now abandoned.

BACKGROUND OF THE INVENTION

This invention relates in general to electrical conductor assemblies and deals more particularly with an improved flexible electrical supply cable.

Recent deregulation of the telephone industry has created further opportunity for others to enter the residential and light commercial telephone cable installation market. It is anticipated that telephone companies may be abandoning responsibility for installation and maintenance of telephones as a result of government "unbundling" of pricing for telephone installation and service, since the cost of new construction installation is likely to become prohibitive due to the loss of supporting business revenues derived from service. It is expected that this gap will be filled by the electrical contractor.

Now with the expanding availability of cable television and data service (CATV/DATA) throughout the United States, an additional cable installation, made at a proper time in a new home construction, is highly desirable and, if available, would probably be specified in a large percentage of new housing starts. A properly trained electrician, equipped with adequate tools, should be capable of installing telephone and CATV/DATA service as well as conventional power supply service.

Heretofore outlet boxes have been available which facilitate single point outlets for power and other service, such as telephone service, for example, however, such systems generally utilize separate cables for each service.

Established electrical codes generally prohibit the presence of electrical supply conductors and electrical conductors for providing other unrelated service, such as a telephone service, within a common insulation jacket, because of potential electrical shock hazards. If a nail or staple is inadvertently driven through such a common jacket and into contact with a normally energized electrical supply conductor and one of the conductors associated with another service, such as, for example, telephone service, the telephone service conductor may acquire the higher voltage potential of the power supply source. The resulting condition presents a potentially serious electrical shock hazard to the telephone installer or user.

It is the general aim of the present invention to provide an improved flexible free-stripping electrical cable assembly which includes within the common jacket power supply conductors and electrical conductors associated with other unrelated service and which overcomes or at least substantially minimizes problems normally associated with such cable arrangement.

A more specific aim of the invention is to provide an improved electrical conductor assembly or cable which enables simultaneous installation of electrical conductors for supplying a plurality of unrelated services and which may be coiled and stored on a reel without kinking the individual conductors which comprise the cable

and readily adapted to conform to specific conditions encountered during cable installation.

SUMMARY OF THE INVENTION

In accordance with the invention an electrical cable comprises a plurality of groups of axially elongated flexible electrical conductors including first, second and third groups, each group including at least one electrical conductor. The groups of conductors are contained within a unitary flexible axially elongated jacket of dielectric material which separates and insulates the conductors of each of the groups from the conductors of the other of the groups. The jacket has distinct axially elongated tubular portions which include a first tubular portion containing the conductors of the first group, a second tubular portion containing the conductors of the second group and a third tubular portion containing the conductors of the third group. A plurality of integral axially elongated web portions hingedly connect the tubular portions for movement relative to each other between first and second positions and include first and second web portions integrally connected to the first tubular portion at points of connection angularly spaced generally about the central axis of the first tubular portion. The first web hingedly connects the second tubular portion to the first tubular portion. The second web hingedly connects the third tubular portion to the first tubular portion. The conductors of the first, second and third groups are disposed to one side of a plane which passes through the points of connection and the conductors of the second group are disposed to the opposite sides of the plane when the tubular portions are in the first position. The conductors of each of the groups are disposed to the same side of the plane and in generally side-by-side relation to each other when the tubular portions are in the second position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary plan view of an electrical cable embodying the present invention.

FIG. 2 is a sectional view taken along the line 2—2 of FIG. 1.

FIG. 3 is similar to FIG. 2 but shows the components which comprise the cable in another position.

FIG. 4 is similar to FIG. 2 but shows another electrical cable embodying the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to the drawing, an axially elongated, flexible electrical conductor assembly embodying the present invention and indicated generally by the reference numeral 10 comprises a composite cable which includes components for providing power, CATV/DATA and telephone service. The illustrated cable 10 is of a free-stripping type, particularly adapted to facilitate simultaneous installation of electrical conductors essential to the provision of such service and includes three components which comprise groups of electrical conductors designated generally by the numeral 12, 14 and 16. A unitary dielectric insulating jacket, indicated generally at 17, separates and insulates the electrical conductors which comprise each of the groups of conductors from the conductors of the other of the groups of conductors.

The insulation jacket 17 is preferably made from an elastomeric material, has three distinct free-stripping

tubular portions each having a generally circular cross section. A first portion of the jacket, indicated by the numeral 18, generally coaxially surrounds the electrical conductors which comprise the first groups of conductors 12. These conductors are particularly adapted to supply telephone service. A second portion of the jacket, indicated by the numeral 20, generally coaxially surrounds the conductors of the second group 14, which constitute power supply conductors. A third portion of the jacket, indicated at 22, coaxially surrounds the third group 16, which comprises a coaxial cable arrangement for CATV/DATA service.

The jacket second portion 20 is connected to the first portion 18 along its length by an integral longitudinally extending web 24. A similar web 26 connects the first portion 18 and the third portion 22. Referring particularly to FIG. 2, it should be noted that the webs 24 and 26 are connected to the jacket first portion 18 at points of connection 27 and 29 angularly spaced about the central axis of the first tubular jacket portion 18 and located to one side of an axial plane 28 which contains the axis of the first portion 18. The webs 24 and 26 provide flexible hinge connections as well as regions of weakening between the component parts of the cable 10, for purposes which will be hereinafter further evident.

Considering the various components of the cable 10 in further detail, the conductor group 12, which is particularly adapted to provide telephone service, preferably includes four non-twisted, individually insulated and color coded AWG No. 24 solid wire telecommunications conductors 32, 32.

The power supply component which comprises the conductor group 14 is particularly adapted for residential power supply and includes two insulated and color code AWG No. 14 solid wire conductors 34, 34 and an uninsulated or bare metallic ground conductor 36 contained within a generally cylindrical dielectric sheath defined by the jacket portion 20. The insulated conductors 34, 34 and the bare metallic conductor 36 are surrounded by a spiral wrapping of metallic foil 38. The metallic foil, which is preferably copper, comprises a flexible coaxial sleeve surrounding the conductors of the group 14, is contained within the dielectric insulation sheath 20 and is in immediate or interrupted electrical contacting engagement with the bare metallic conductor 36 along a substantial portion of its length for a purpose which will be hereinafter further evident.

The CATV/DATA component 16 conforms with present industry standards and includes a single AWG No. 20 solid wire conductor 40 coaxially surrounded by a generally cylindrical layer of foam dielectric material 42. A generally cylindrical flexible shield 44, preferably formed by a spiral wrapping of aluminum foil, coaxially surrounds the dielectric layer 42. Another flexible cylindrical shield 46, preferably made from sixty percent aluminum braided wire, coaxially surrounds the shield 44 within the insulation sheath formed by the generally cylindrical jacket portion 22.

The web portions 24 and 26 extend along the length of the cable 10 in generally parallel relation to the longitudinal axis of the cable and form flexible hinges between the components 12, 14 and 16 so that the three components may be positioned with the conductors thereof in generally side-by-side or in line relation, as shown in FIG. 2, to provide a substantially flat cable arrangement wherein the telephone component 12 is disposed generally between the power supply compo-

nent 14 and the CATV/DATA component 16. In the latter position all of the conductors which comprise the cable 10 are disposed to the same side of a plane, indicated at 48, passing through the points of connection 27 and 29, as shown in FIG. 2. This side-by-side arrangement of the various conductors facilitates coiling or winding the cable 10 on a reel (not shown) which eliminates any substantial risk of kinking conductors. The arrangement of the hinged web connections between the various components is such that the cable 10 may be formed from the cross-sectional configuration shown in FIG. 2 to the cross-sectional configuration shown in FIG. 3 by hinged flexure of the components 14 and 16 at the webs 24 and 26 and relative to the component 12 and to each other, when the cable 10 is pulled from an associated reel. When the cable components are arranged in a generally delta configuration, as shown in FIG. 3, the components 20 and 22 are disposed immediately adjacent each other and the conductors contained therein, which comprise the conductor of the second and third groups 14 and 16 are disposed to one side of the plane 48, whereas the conductors which comprise the first group 12 are disposed to the opposite side of the plane 48. The three components 12, 14 and 16 lie within the boundary of an imaginary circle indicated by broken lines in FIG. 3. This arrangement of the components enables reduction of the major cross-sectional dimension of the cable so that it may pass freely through a circular opening of a predetermined size without encountering substantial frictional resistance. The illustrated cable 10 is particularly adapted for residential installation and is or may be sized to pass freely through a cylindrical hole of industry standard without substantial frictional resistance.

In addition to shielding the telephone components 12 and the CATV/DATA component 16 from electromagnetic interference, the shield 38 in the power supply component 14 also cooperates with the bare metallic ground conductor 38 to provide an important safety feature. If, during building construction, for example, a metal nail or staple is inadvertently driven through the power supply component and contacts a normally energized conductor, the nail or staple is at ground potential having passed through the metallic shield 38, which is grounded by the ground conductor or wire 36. Thus, the energized conductor will immediately short to ground. If this condition should occur during construction and before the cable is connected to a power source, the system will be shorted when the cable is connected to the power supply source. If the cable is properly handled this arrangement should prevent accidental energization of either the telephone component or the CATV/DATA component by the power supply component when the cable is installed.

If desired, an additional metallic sleeve (not shown) may be provided in the telephone service component 12 within the insulation sheath 18 and in generally coaxially surrounding relation to the conductors 32, 32 to further shield against both conducted and radiated noise interference.

The connecting web portions 24 and 26 comprise weakened regions of the insulation jacket 17 which enable the various free-stripping components 12, 14 and 16 to be readily selectively separated from each other. Thus, either and both of the components 14 and 16 may be readily separated from the component 17 by applying tearing force to end parts of an appropriate two of the three components 12, 14 and 16. The tearing force

is, of course, applied in laterally opposite directions relative to the longitudinal axis of the conductor assembly 10.

Referring now to FIG. 4, another electrical conductor assembly or cable embodying the present invention is indicated generally at 10a. The cable 10a is similar in many respects to the cable 10, previously described, and parts of the cable 10a which correspond to parts of the cable 10 are identified by the same reference numeral with a letter "a" suffix. The essential differences between the cable 10a and the previously described cable 10 reside in the construction of the power supply component and its arrangement relative to the telephone and CATV/DATA components, which will be hereinafter described.

The cable 10a has a unitary dielectric insulation jacket indicated generally at 17a which includes distinct first, second and third jacket portions indicated respectively at 18a, 20a and 22a connected by webs 24a and 26a which provide flexible hinge connections between the various jacket portions, substantially as previously described. The illustrated cable 10a is a free-stripping type in that the various distinct tubular portions of the jacket 17a are not adhered to the components contained therein. Thus, when terminal ends of the tubular jacket portions are removed, the electrical conductors contained therein are exposed and are readily separable from each other and from the surrounding portion of the jacket.

The first jacket portion 18a contains a power supply component which comprises a conductor group 14a and includes two insulated color coded solid wire conductors 34a, 34a and an uninsulated or bare metallic ground conductor 36a. An axially elongated shaped insulating spacer 50, which preferably comprises a flexible elongated extrusion of dielectric plastic material, is also located within the jacket first portion 18a and serves to maintain the conductors 34a, 34a and 36a in generally predetermined spaced apart position relative to each other. As shown, the spacer 50 has axially extending arcuate grooves 52, 52 for receiving and retaining the conductors 34a, 34a and another arcuate groove 54 for receiving and containing the bare conductor 36a. A spiral wrapping of metallic foil 38a, preferably copper, is located within the jacket portion 18a and surrounds the conductors which comprise the group 14a. The jacket portion 18a preferably closely surrounds the flexible metallic sleeve 38a, the conductors 34a, 34a and 36a and the spacer 50, substantially as shown in FIG. 4. Thus, the tubular jacket portion 18a cooperates with the spacer 50 to retain the conductors which comprise the power supply component 14a in predetermined spaced relation to each other. Further, the jacket portion 18a cooperates with the spacer to maintain the bare metallic conductor 36a in substantial uninterrupted electrical contacting engagement with the flexible metallic shield 38a along a substantial portion of the length of the bare metallic conductor.

In the illustrated embodiment 10a the second jacket portion 20a contains a telephone component 12a which, as shown, includes eight individually insulated telecommunications conductors 32a, 32a. The illustrated jacket portion 20a also contains a flexible metallic shield 56 formed by a wrapping of metallic foil and surrounding the conductors 32a, 32a. However, the shield 56 may be omitted, if desired. The third jacket portion 22a contains a CATV/DATA component 16a substantially identical to the component 16, previously described.

The webs 24a and 26a are connected to the jacket portion 18a at points of connection indicated at 27a and 29a. The included angle between the points of connection 27a and 29a, as measured about the central axis of the jacket portion 18a and indicated by the letter A in FIG. 4, is preferably at least 60 degrees but not greater than 100 degrees. The length of each web as measured between its point of connection to the jacket portion 18a and its point of connection to an associated jacket portion is preferably as short as possible while allowing hinge flexure of the components between the full line and broken line portions of FIG. 4.

The outer jacket 17a preferably comprises an extruded plastic material, being preferably extruded in the form in which it appears in full lines in FIG. 4, wherein the three service components are maintained in a Delta cross-sectional configuration relative to each other. In the latter position the three components lie within an imaginary circle, such as shown in broken lines in FIG. 4, which may, for example, represent a typical opening through which the cable 10a may be pulled. When the cable 10a is in the position shown in FIG. 4, the second and third groups of electrical conductors 12a and 16a are disposed to one side of an imaginary plane 48a passing through the points of connection 27a and 29a. The conductors which comprise the first group 14a are disposed to the opposite of the plane 48a. When the jacket 18a and 22a portions are flexed about the webs 24a and 26a and to their respective broken line positions of FIG. 4, all of the conductors which comprise the first, second and third groups of conductors are generally disposed to the same side of the plane 48a and lie in generally side-by-side or in-line relation to each other so that the cable 10a may be wound onto a reel (not shown) or the like with each of the conductors being wound to approximately the same radius as the others, whereby the risk of kinking the various conductors is minimized.

The cable of the present invention facilitates cost-saving installation of power, video/computer and telephone service wiring. The telephone component facilitates the installation of many circuits for miscellaneous control, monitor or audio applications, as may be required.

The invention has been illustrated with reference to cable assemblies having particular arrangements of electrical conductors, however, it should be understood the size, number and type of electrical conductors which comprise the various cable components may vary and that further modified forms of the cable are contemplated within the scope of the invention.

We claim:

1. An electrical cable comprising a plurality of groups of axially elongated flexible electrical conductors including first, second and third groups, each of said groups including at least one electrical conductor, and a unitary flexible axially elongated jacket of dielectric material separating and insulating said conductors of each of said groups from said conductors of the other of said groups, said jacket having distinct axially elongated tubular portions including a first tubular portion containing said conductors of said first group, a second tubular portion containing said conductors of said second group and a third tubular portion containing said conductors of said third group, a plurality of integral axially elongated web portions hingedly connecting said tubular portions for movement relative to each other between a first position and a second position and including first and second web portions integrally con-

ected to said first tubular portion at points of connection angularly spaced generally about the central axis of said first tubular portion, said first web hingedly connecting said second tubular portion to said first tubular portion, said second web hingedly connecting said third tubular portion to said first tubular portion, said conductors of said second and third groups being disposed to one side of a plane passing through said points of connection and said conductors of said first group being disposed to the opposite side of said plane when said tubular portions are in said first position, said conductors of said first group, said second group and said third group being disposed to the same side of said plane when said tubular portions are in said second position, said first and second web portions cooperating with said tubular portions to maintain said tubular portions in generally side-by-side relation to each other with said first tubular portion disposed between said second tubular portion and said third tubular portion and with said second tubular and said third tubular portion in adjacent contacting engagement with said first tubular portion when said tubular portions are in said second position.

2. An electrical cable as set forth in claim 1 wherein at least one of said groups includes a plurality of electrical conductors and said cable includes an axially elongated spacer contained with an associated one of said tubular portions containing the conductors of said at least one group, said spacer cooperating with said associated one tubular portion to retain the conductors of said at least one group in spaced apart relation to each other.

3. An electrical cable as set forth in claim 2 wherein said cable includes an axially elongated flexible metallic sleeve contained within said associated one tubular portion and said sleeve contains said spacer and the conductors of said at least one group.

4. An electrical cable as set forth in claim 3 wherein one of the conductors in said at least one group comprises a bare metal conductor and said spacer and said one tubular portion cooperates to retain said associated one bare metal conductor in generally contacting engagement with said metallic sleeve along a substantial portion of the length of said bare metal conductor.

5. An electrical cable as set forth in claim 3 wherein said sleeve comprises a spiral wrapping of copper foil.

6. An electrical cable as set forth in claim 3 including another flexible metallic sleeve contained within another of said tubular portions containing the conductor of another of said groups and said another metallic sleeve generally coaxially surrounds the conductors of said another of said groups.

7. An electrical cable as set forth in claim 1 wherein the included angle between said angularly spaced points of connection is at least 60 degrees and not greater than 100 degrees.

8. An electrical cable as set forth in claim 7 wherein said included angle comprises approximately 60 degrees.

9. An electrical cable as set forth in claim 1 wherein said webs normally maintain said tubular portions in said first position.

10. A conductor assembly comprising first, second and third groups of axially elongated flexible electrical conductors, each of said groups including at least one electrical conductor, and a unitary axially elongate flexible free stripping jacket of dielectric material isolating the conductors of each of said groups from the conductors of the other of said groups, said jacket hav-

ing a distinct free-stripping portions including a first portion containing said first group, a second portion containing said second group, and a third portion containing said third group, an elongated first web extending in generally parallel relation to the axis of said conductor assembly and connected at a first point of connection to said first portion, said first web hingedly connecting said second portion in parallel spaced relation to said first portion, an elongated second web extending in axially parallel relation to the axis of said conductor assembly and connected at a second point of connection to said first portion, said second web hingedly connecting said third portion in parallel spaced relation to said first portion, said second and third portions being hingedly movable relative to each other and to said first portion about axes of flexure defined by said first and second webs between a first portion wherein the conductors of said second and third groups are disposed to one side of a plane passing through said points of connection and the conductors of said first group are disposed to the opposite side of said plane and a second position wherein said first and second webs cooperate with said first portion, said second portion and said third portion to maintain said second portion and said third portion in adjacent side-by-side relation to said first portion and said first group, said second group and said third group in in-line relation with each other at the same side of said plane.

11. An electrical conductor assembly as set forth in claim 10 wherein either and both said second and third portions are separable from said first portion and from each other in response to tearing force applied to end parts of two of said portions in laterally opposite directions relative to the axis of said conductor assembly.

12. An electrical conductor assembly as set forth in claim 10 wherein one of said groups comprising said first, second and third groups includes a plurality of individually insulated electrical conductors and an uninsulated electrical conductor and said assembly includes a flexible metallic sleeve coaxially surrounding the conductors of said one of said groups in general electrical contacting engagement with said uninsulated conductor along a substantial portion of the length of said uninsulated conductor.

13. An electrical cable assembly comprising a unitary flexible free-stripping electrical insulation jacket and a plurality of separate cable components contained within separate free-stripping generally cylindrical tubular portions of said jacket and including a flexible power supply component contained with a first portion of said jacket and having a plurality of individually insulated power supply conductors and a ground conductor, a flexible telephone supply component contained with a second portion of said jacket and including a plurality of individually insulated telephone service conductors, and a flexible television/data cable component contained within a third portion of said jacket and including a single electrical conductor, a layer of electrical insulating material coaxially surrounding said single conductor, and a second metallic sleeve coaxially surrounding said layer of insulating material, said jacket including a plurality of webs connected to one of the portions comprising said first, second and third portions of said jacket at points of connection angularly spaced about the axis of said one of said portions and to the other of the portions of said jacket for hinged flexure between one position wherein said one of the portions is disposed generally intermediate said other of the portions and in

tangential contact with said other of the portions and all of the cable components are disposed to the same side of a plane parallel to the axis of said cable and extending generally through said points of connection and another position wherein said cable components contained within said one of said portions and the cable components contained within said other of said portions are located at opposite sides of said plane.

14. An electrical cable assembly as set forth in claim 13 wherein said webs define regions of weakening along which one of said components is selectively separable from either and both of the other of said components in response to tearing force applied to end parts of two of said components in generally laterally opposite directions relative to the axis of said cable assembly.

15. An electrical cable assembly as set forth in claim 13 wherein said first of said portions comprises said one portion.

16. An electrical cable assembly as set forth in claim 13 including a dielectric spacer disposed within said first portion and separating said power supply conductors from each other and from said ground conductor.

17. An electrical cable comprising a plurality of groups of axially elongated flexible conductors including first, second and third groups, each of said groups including at least one conductor, and a unitary flexible axially elongated jacket of dielectric material isolating

said conductors of each of said groups from said conductors of the other of said groups, said jacket having distinct axially elongated tubular portions including a first tubular portion containing said conductors of said first group, a second tubular portion containing said conductors of said second group and a third tubular portion containing said conductors of said third group, a plurality of integral axially elongated web portions hingedly connecting said tubular portions for movement relative to each other between a first position and a second position and including first and second web portions integrally connected to said first tubular portion at points of connection angularly spaced generally about the central axis of said first tubular portion, said first web hingedly connecting said second tubular portion to said first tubular portion, said second web hingedly connecting said third tubular portion to said first tubular portion, said conductors of said second and third groups being disposed to one side of a plane passing through said points of connection and said conductors of said first group being disposed to the opposite side of said plane when said tubular portions are in said first position, said conductors of each of said groups being disposed to the same side of said plane and in immediately adjacent side-by-side relation to each other when said tubular portions are in said second position.

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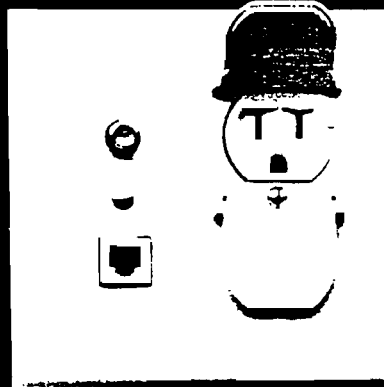
APPENDIX 3

TRI-CON PRODUCT - DESCRIPTION

Installation Instruction Guide

TRI/CON™

A TOTAL WIRING SYSTEM



VIDEO
POWER
TELEPHONE

A Unique System in a Single Outlet

- Complete—contains all cable, fittings, and wiring devices.
- Reduces installation costs up to two-thirds.
- Makes Telephone and Video part of your wiring installation.
- Expandable—Adaptable—Versatile

BRAND-REX

BRAND-REX COMPANY
ELECTRONIC & INDUSTRIAL CABLE DIVISION
Willimantic, CT 06226

BRAND-REX

TRI/CON™ Assembly - Exploded View

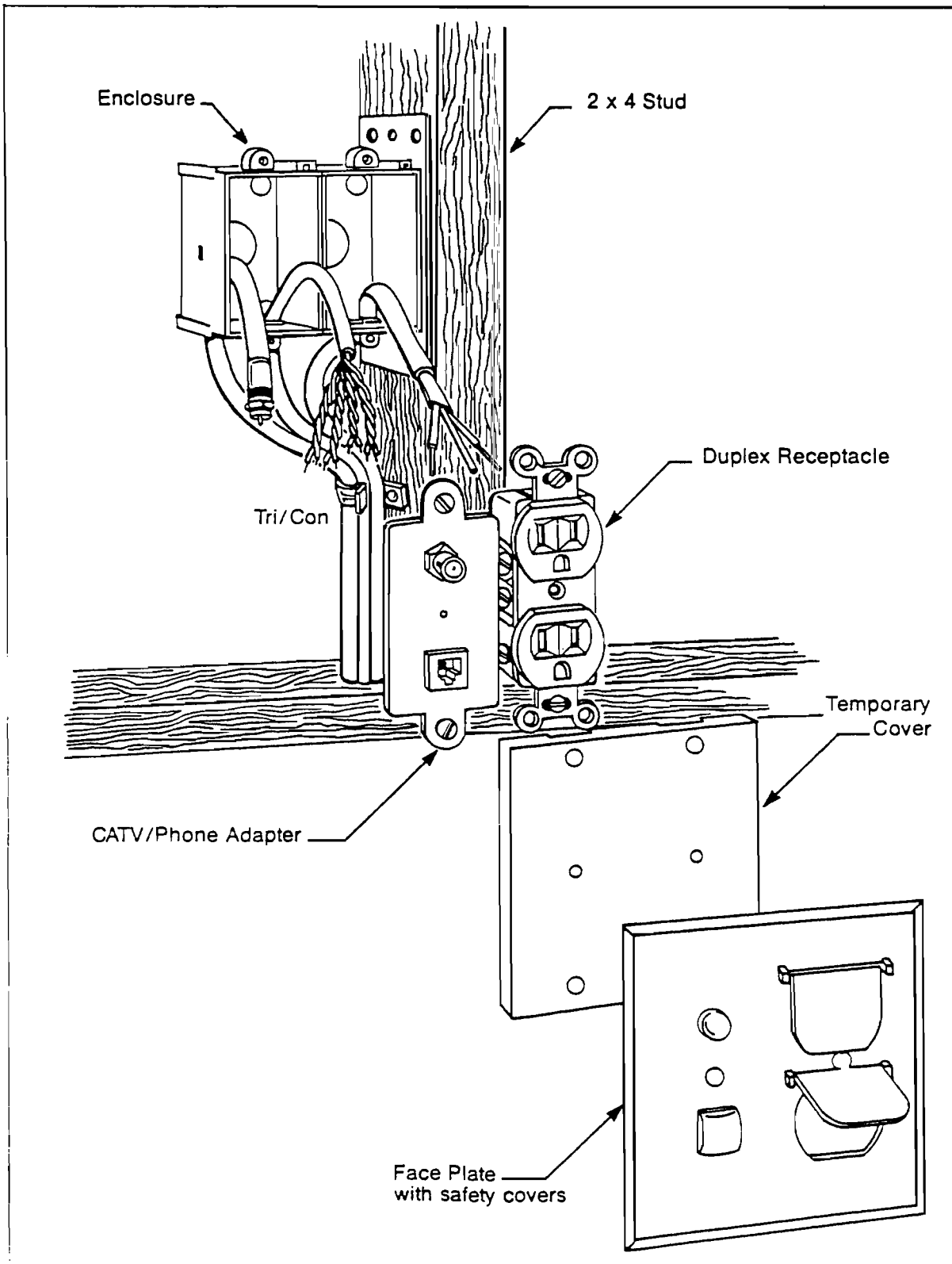
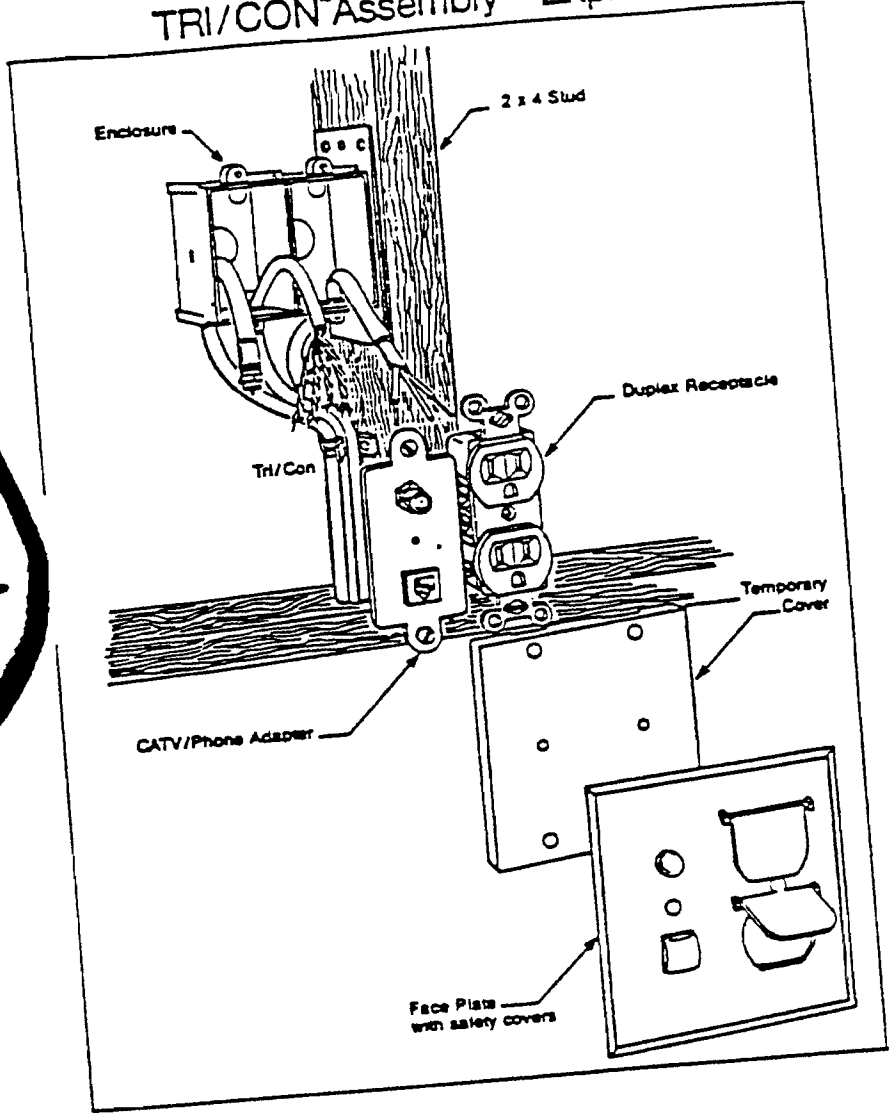


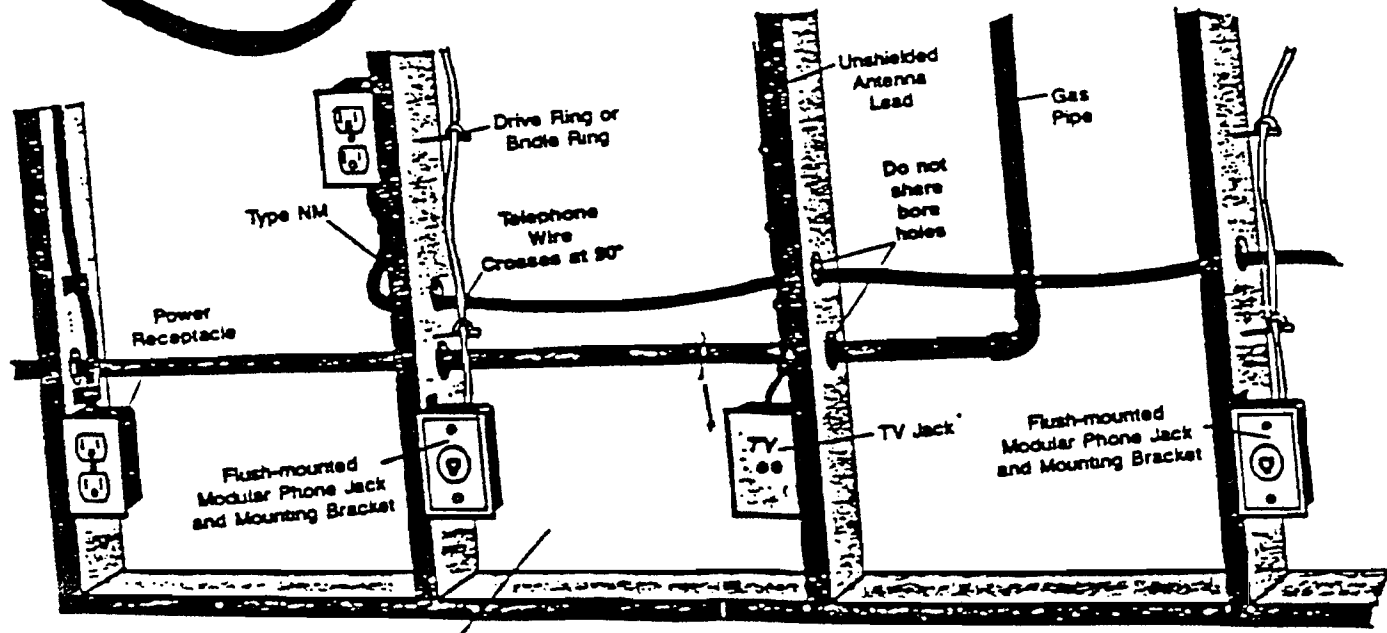
Fig. 1

TRI/CON Assembly - Exploded View



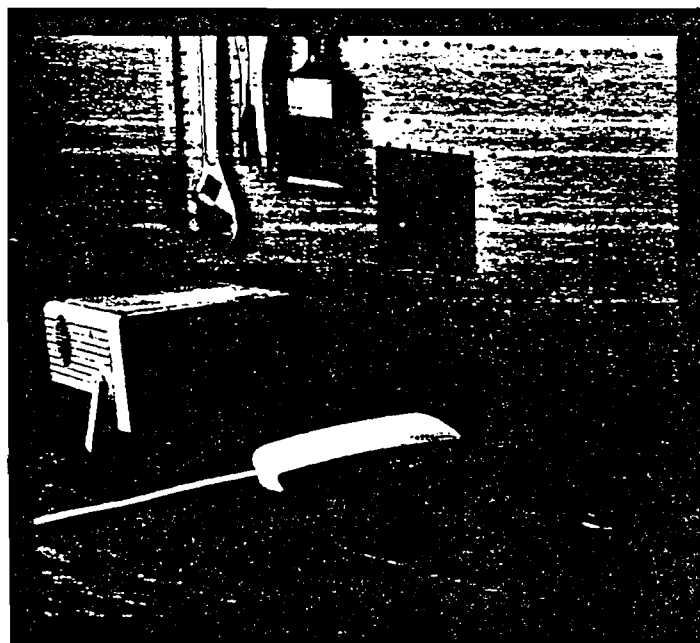
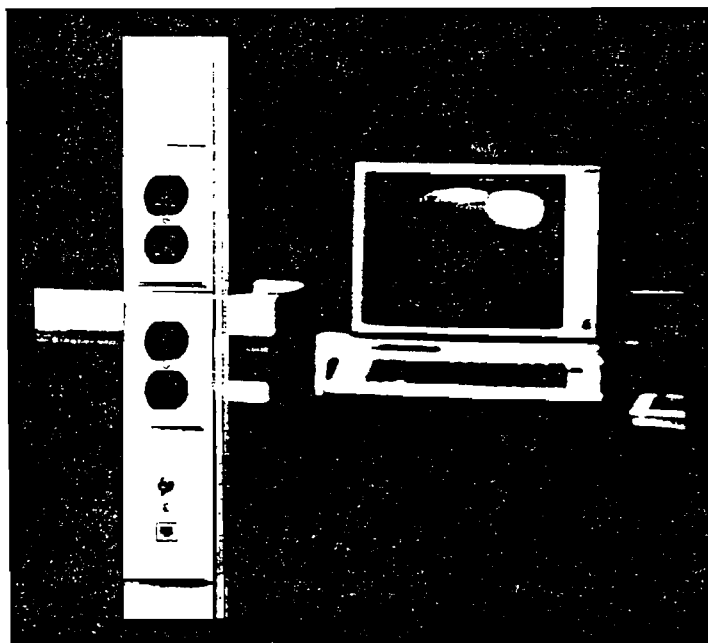
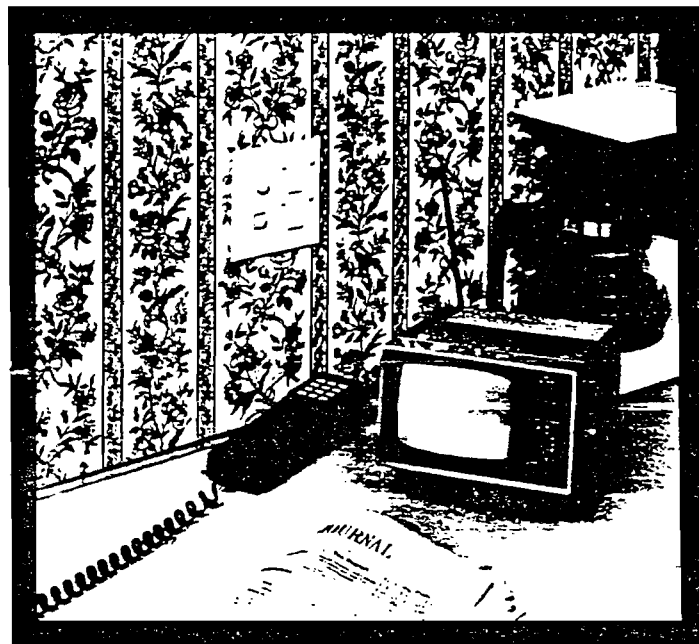
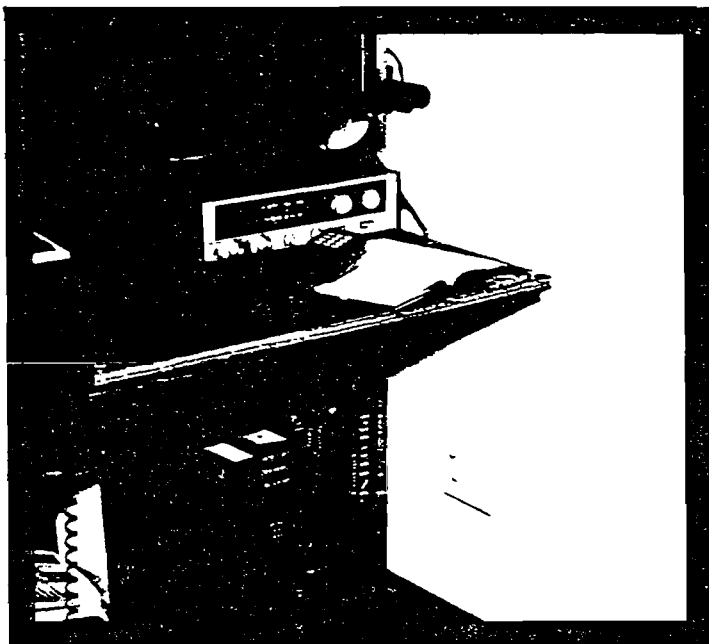
THINK ABOUT IT!...

THIS REPLACES THIS!



Do not share stud space with electrical power

Make Telephone and Video Part of Your Wiring Installation

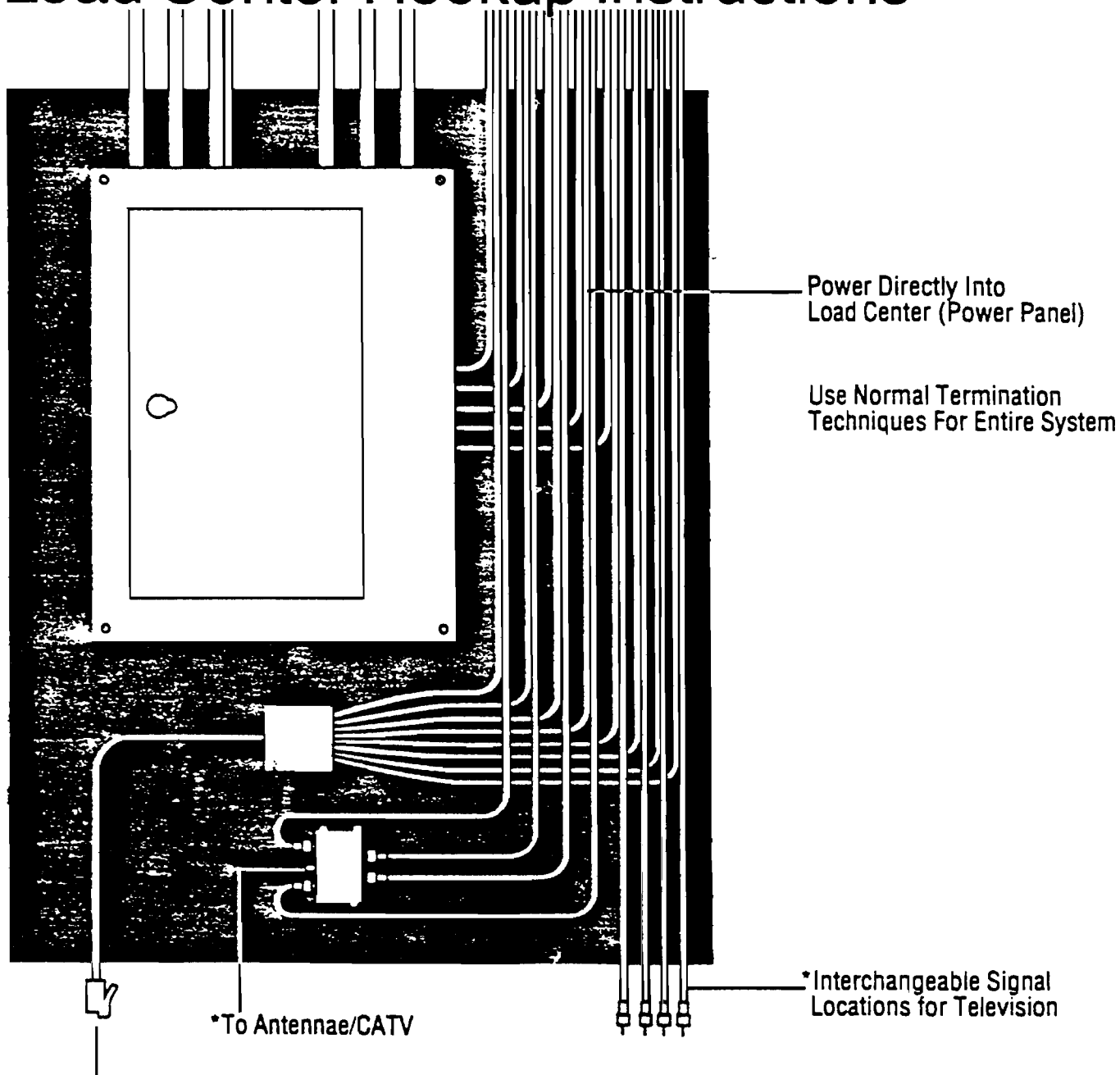


BRAND-REX

TRI/CON™ - DUO/CON™

A Total Wiring System

Load Center Hookup Instructions



To SNI
(Aid To Troubleshooting Telephone Problems
With Hardwire To Modular Configuration)



*CATV Company May Require Coaxial Cable
To Reach Outside of Home for Hookup.



UNDERWRITERS LABORATORIES INC.

1225 WALT WHITMAN ROAD · MELVILLE, LONG ISLAND, NEW YORK 11747

an independent, not-for-profit organization testing for public safety
MELVILLE - December 6, 1985

Brand Rex Company
Mr. Lon H. King
Manager, New Product Development
P.O. Box 498
Route 32
Willimantic, CT 06226

Our Reference: E24573, 83ME15356A

Subject: Listing of Power-Telephone - CATV/Data Wiring System

Dear Mr. King:

UL has completed an investigation of samples of the subject product. The tests have been completed with acceptable results. Therefore, we are listing this cable under our product category "Wires, Miscellaneous."

We wish to emphasize at this time, evidence that cable manufactured under this product category is Listed under UL's Follow-Up Program is use of UL's Listing Mark on the cable.

Should you have any questions concerning the above, please contact us.

Very truly yours,

C. S. KOLACZYK
Engineering Group Leader
Electrical Department

REVIEWED BY:

E. J. COFFEY
Associate Managing Engineer
Electrical Department

CSK:js
MS12



John Federowicz
Sales Representative

**BRAND-REX
CABLE SYSTEMS DIVISION**
1500 West Main Street
Willimantic, CT 06226-1128
203/456-8000



LISTED 454C
**POWER-TELEPHONE-CATV/DATA
WIRING SYSTEM**

ROUGH WIRING----TRI-CON

The AC Power Cable and the duplex receptacle will always be in the right side cavity and the Telephone/Television will always be in the left side cavity of the wall box no matter what side of the stud the wall box is mounted.

Always leave an extra 2-3 feet of Tri-Con Cable extended past the load center. This will make the job of final tie-in much easier.

Leave an extra 12 inches of each cable at every wall box.

Separate the Tri-Con into 3 conductors by pulling the leads apart. Place the Telephone cable(s) thru a lower port of the left side cavity of the wall box. Leave an extra 8 inches of cable. Remove the outer jacket of about 7 inches of this cable.

Place the Coax cable(s) thru the upper port(s) of the left side cavity of the wall box. (One Coax cable to one port). Cut the Coax flush with the open portion of the wall box. This is the correct length to accept the F Connectors and the 2-Way Splitter.

Place the AC Power conductors into the right side cavity of the wall box. Leave about 8 inches of wire. Remove about 7 inches of the outer jacket, copper casing and triangular insulator of the AC Power cable before pushing these wires into the wall box.

*****IT IS MOST IMPORTANT THAT THE TV COAX CABLE(S) BE TERMINATED WITH F CONNECTORS BEFORE SHEETROCK, WALL COVERING AND/OR INSULATION IS INSTALLED.*****

Remove the Coax lead(s) from the wall box and follow the procedure on the reverse side of this page. Return the Coax back into the cavity. (You may want to attach the 2-Way Splitter at this time.)

The Telephone Jack may be terminated now or after the sheetrock. Here is how. Separate the Telephone conductors and arrange them in the color coded order that you find on the Jack without stripping the outer covering. Bend the last 1/4 inch of the conductors to a right angle using needlenose pliers. Insert the bent conductors into the proper color coded slots. Squeeze them into place with the plastic holder. If two sets of conductors are to be used in the Jack, simply remove the plastic holder and following the directions above, put the second set of conductors into place and reattach the plastic holder.

To protect from dust or joint compound place a wad of paper or cloth over the Coax and Telephone connection.

These are the pages and paragraphs of the current NATIONAL ELECTRICAL CODE that allow the use of TRI-CON™ CABLE and TRI-CON™ ENCLOSURES. The hi-lited areas are the specific statements allowing TRI-CON™ use.

ARTICLE 725 — REMOTE CONTROL, SIGNALING CIRCUITS 70 679

of higher ratings. The overcurrent device shall be permitted as an integral part of the power supply.

725-36. Location of Overcurrent Devices. Overcurrent devices, where required, shall be located at the point where the conductor to be protected receives its supply.

725-37. Wiring Methods on Supply Side. Conductors and equipment on the supply side of overcurrent protection, transformers, or current-limiting devices shall be installed in accordance with the appropriate requirements of Chapter 3. Transformers or other devices supplied from electric light or power circuits shall be protected by an overcurrent device rated not over 20 amperes.

Exception: The input leads of a transformer or other power source supplying Class 2 and Class 3 circuits shall be permitted to be smaller than No. 14, but not smaller than No. 18 if they are not over 12 inches (305 mm) long and if they have insulation that complies with Section 725-16(b).

725-38. Wiring Methods and Materials on Load Side. Conductors on the load side of overcurrent protection, transformers, and current-limiting devices shall be insulated at not less than the requirements of Section 725-40 and shall comply with (a) and (b) below.

(a) Separation from Electric Light, Power, and Class 1 Conductors.

(1) Open Conductors. Conductors of Class 2 and Class 3 circuits shall be separated at least 2 inches (50.8 mm) from conductors of any electric light, power, or Class 1 circuits.

Exception No. 1: Where either: (1) all of the electric light, power, and Class 1 circuit conductors, or (2) all of the Class 2 and Class 3 circuit conductors are in raceways or in metal-sheathed, metal-clad, nonmetallic-sheathed, or Type UF cables.

Exception No. 2: Where the conductors are permanently separated from the conductors of the other circuits by a continuous and firmly fixed nonconductor, such as porcelain tubes or flexible tubing in addition to the insulation on the wire.

(2) In Enclosures, Raceways, Cable Trays, and Cables. Conductors of Class 2 and Class 3 circuits shall not be placed in any enclosure, raceway, cable tray, cable, compartment, outlet box, or similar fitting with conductors of electric light, power, and Class 1 circuits.

Exception No. 1: Where the conductors of the different circuits are separated by a partition.

Exception No. 2: Conductors in outlet boxes, junction boxes, or similar fittings, or compartments where power-supply conductors are introduced solely for supplying power to the equipment connected to Class 2 or Class 3 circuits to which the other conductors in the enclosure are connected.

Exception No. 3: Underground conductors in a manhole where one of the following conditions is met:

a. The electric light or power and Class 1 circuit conductors are in a metal-enclosed cable or Type UF cable;

b. The conductors are permanently separated from the conductors of the other circuits by a continuous and firmly fixed nonconductor such as flexible tubing. In addition to the insulation or covering on the wire;

c. The conductors are permanently and effectively separated from conductors of the other circuits and securely fastened to racks, insulators, or other approved supports.

(3) In Holstways. Class 2 or Class 3 conductors shall be installed in rigid metal conduit, intermediate metal conduit, or electrical metallic tubing in holstways.

Exception: As provided for in Section 620-21, Exceptions No. 1 and 2 for elevators and similar equipment.

(b) Fire Resistance of Cables.

(1) Wiring Within Buildings. Single- and multiconductor cables of Class 2 and Class 3 circuits installed as wiring within buildings shall be Type CL2, CL3, or PLTC, listed as being resistant to the spread of fire. This listing requirement for Types CL2 and CL3 cables shall become effective July 1, 1988. In addition, where the cables are in a vertical run in a shaft, Section 725-38(b)(2) shall apply, and where the cables are installed in ducts, plenums, and other air-handling spaces, Section 725-38(b)(3) shall apply. Types CL2R and CL3R cables listed for use in vertical runs in accordance with Section 725-38(b)(2) and Types CL2P and CL3P cables listed for use in ducts, plenums, and other air-handling spaces in accordance with Section 725-38(b)(3) shall be permitted to be used to meet the requirements of this section.

(1)(FN): One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the Vertical Tray Flame Test in UL 1581.

Exception No. 1: Where the cables are enclosed in raceway or noncombustible tubing.

Exception No. 2: In noncombusted spaces where the exposed length of cable does not exceed 10 feet (3.05 m).

Exception No. 3: Listed Type CL2X Class 2 cables less than 0.25 inch (6.4 mm) in diameter and listed Type CL3X Class 3 cables less than 0.25 inch (6.4 mm) in diameter and installed in one- or two-family or multifamily dwellings.

(1)(FN): One method of determining the fire resistance of CL2X and CL3X cables is by testing the cables to the VW-1 requirements in UL 1581.

(2) In Vertical Runs. Single- and multiconductor cables of Class 2 and Class 3 circuits in a vertical run in a shaft shall be Type CL2R or CL3R listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor. Cables listed for use in ducts, plenums, and other air-handling spaces in accordance with Section 725-38(b)(3) shall be permitted to be used to meet the requirements of this section.

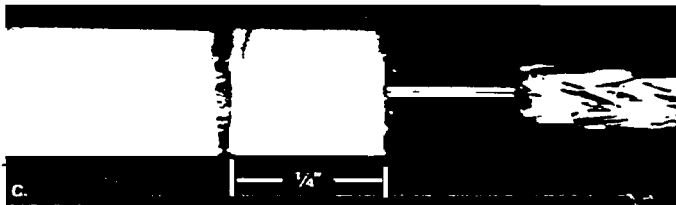
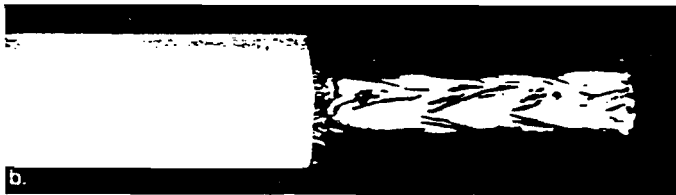
Exception: Where the cables are encased in noncombustible tubing or are located in a fireproof shaft having firestops at each floor.

(3) In Ducts, Plenums, and Other Air-Handling Spaces. Single- and multiconductor cables of Class 2 and Class 3 circuits and equipment installed in ducts or plenums or other spaces used for environmental air shall also comply with Section 300-22 as to installation methods.

Exception: Types CL2P and CL3P single- and multiconductor cables of Class 2 and Class 3 circuits listed as having adequate fire-resistant and low-

TRI/CON Cable Preparation Procedure

Fig. 4



CATV RG-59/RG-6 Coaxial Cable

a. Cut jacket, shields and dielectric to center conductor . . .
Avoid nicking center conductor.

b. Remove outer jacket.
Cut any remaining shield strands.

c. Cut around jacket to shield . . .
Avoid nicking shield strands.

d. Remove 1/4" jacket, then remove dielectric "slug" by twisting and pulling motion.

e. Fold shield back over jacket.

f. Insert "F" type connector over prepared cable end . . . center the dielectric inside tube and braided shield under ferrule and push until the dielectric is flush to the face inside the thread.

g. Make hex crimp over ferrule.
Cut center conductor back to dimension illustrated.

NOTE: See detailed instructions enclosed with individual product package.

FINISH WIRING

AC Power.... Using standard wire strippers remove 1/2 inch of insulation from each insulated conductor. Do not nick the conductor. Terminate the AC conductors to the duplex receptacle by inserting the wires into the holes located on the back side of the receptacles or by connecting the conductors to the screw terminals on the side of receptacle.

Terminate the Telephone Jack if not already done.

Terminate the 2-Way Splitter if not already done.

Align the duplex receptacle and tighten screws.

Align the CATV/Phone adapter plate and tighten screws.

Add the faceplate and tighten screws.

Set the TV and Telephone covers into place.

AT THE LOAD CENTER

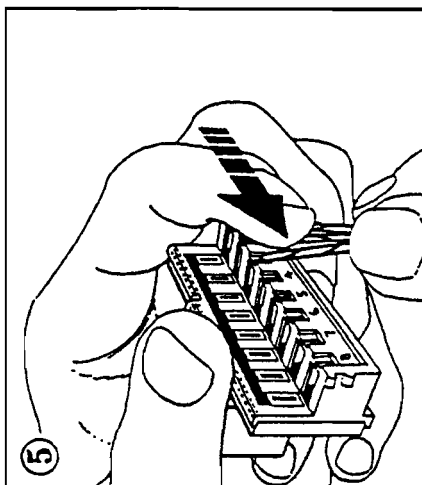
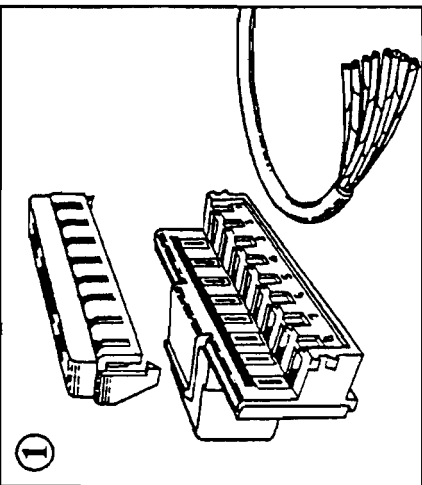
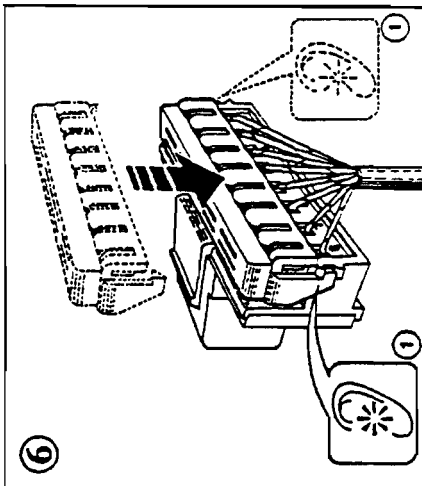
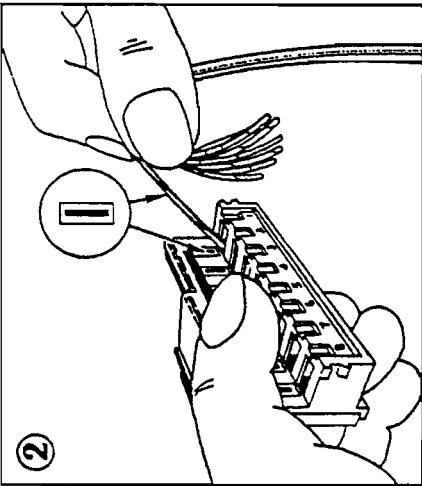
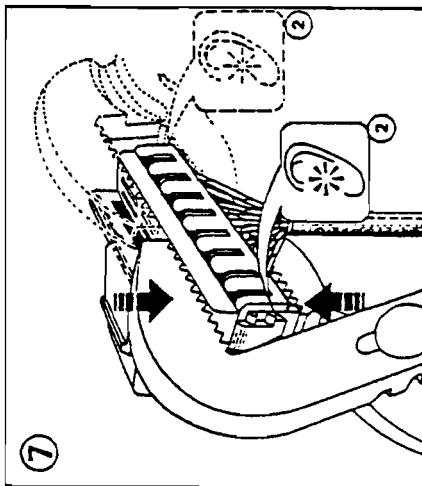
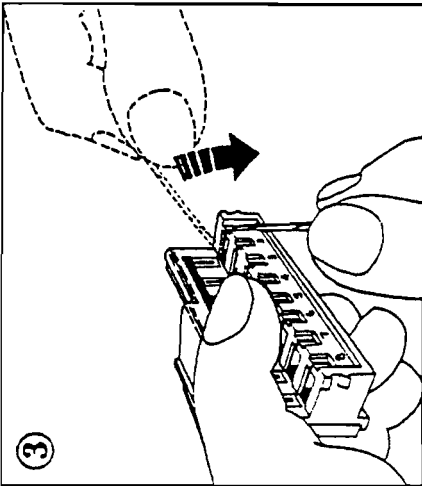
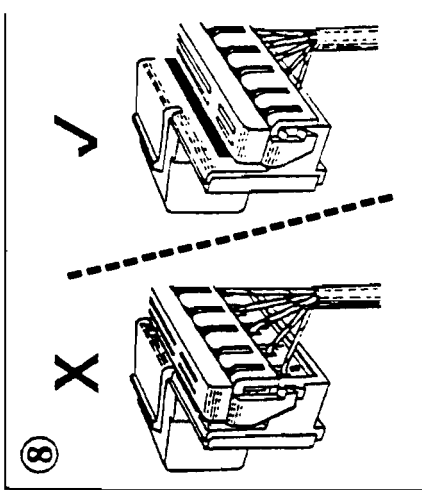
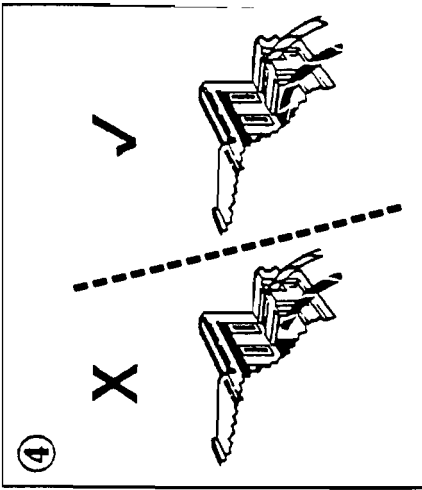
Separate the conductors. Wire the AC Power leads directly into the circuit breaker box.

Group the Television leads and connect them to a multiple splitter, leaving one post for the incoming signal.

Group the Telephone leads and connect them to a Telephone Terminal. You may find the Telephone Terminal to have a different color code, in which case, the Blue lead corresponds to Red and the White with Blue Stripe lead corresponds to the Green. The Telephone Terminal will have a single plug end that is inserted into the SNI (Subscriber's Network Interface) that is supplied by your Telephone Company.

PARTS LIST FOR A TRI-CON KIT

- A two gang RACO wall box and two nails
- A duplex receptacle -A CATV/Phone Adapter Plate and two screws
- A 2-Way Splitter with mounting nut and washer
- Two F Connectors -A Telephone Jack -A Telephone Jack cover
- A TV Coax cover -A Face Plate and two mounting screws



APPENDIX 4
CEBUS WIRING TOPOLOGY

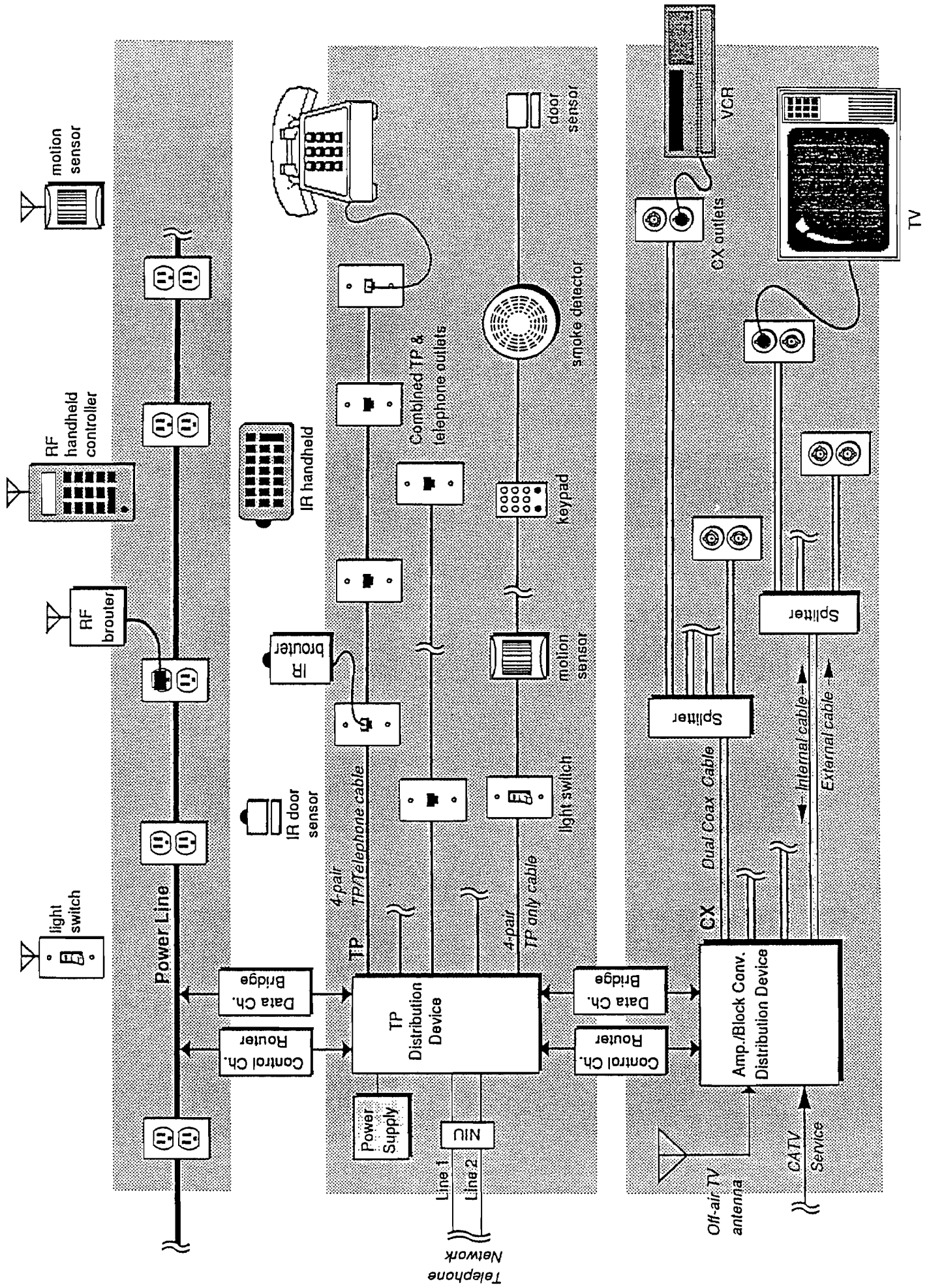


Figure 1, CEBus Network Topology



RECOMMENDED GUIDELINES FOR NEW CONSTRUCTION
TO SUPPORT CEBustm

AC Wiring - The CEBustm power line communications (PLBus) does not place any unusual requirements on the AC wiring of the home. We recommend that you install a coupling capacitor (0.22 ufd, 250 VAC) between the two phases of the powerline to facilitate communications. Coupling capacitors, UL-approved, are available through electrical supply houses. This installation should be done at the service panel by a licensed electrician.

Twisted Pair Wiring - When the home is being wired for telephone service is an opportune time to install the CEBustm twisted pair (TPBus) wiring.

In recent years the star wiring system for telephones has replaced outdated loop wiring, as it is more suitable for contemporary residential applications. In this system, a distribution panel serves as a distribution point where wiring enters the home. In the most common configuration, a separate four-pair wire is routed to each room from the distribution panel.

Within each room a wiring run can connect one or more jacks in series. For applications requiring ultimate flexibility, a pure star wiring approach is recommended. In this system, each outlet in the home is wired directly to the distribution panel. Normally the distribution panel(s) are located where they can be accessed conveniently when necessary (e.g., a basement, utility room, etc.).

We recommend that a second four-wire pair be installed at the same time to serve as the TPBus for CEBustm. This additional wiring should be available, for later access, at each telephone outlet. In addition, runs should be made to areas of the home where there may be a requirement for future TPBus service. These are locations such as the attic, basement, attached garage, etc., where you may want to access the heating, ventilation, or air conditioning systems (HVAC) or special purpose sensors (temperature sensors, smoke alarms, etc.). The wire for both telephone and TPBus application should be 24 AWG copper 8-conductor wiring, "DIW" wire in four twisted pairs. Also, we recommend that each wire run be tagged at the distribution panel to mark the room or location serviced. A 110 volt junction box should be located near the TPBus distribution panel for the power supply and the TPBus to PLBus bridge which will permit communications in the home between the two media.

Coaxial Cable Wiring - The CEBustm cable system, CXBus, should be installed if the homeowner desires the capability of distributing video signals from VCRs, door cameras, etc., throughout the house. This consists of a dual coax wiring system to each outlet and the necessary control unit to be installed later. The two cables can be wired in a loop throughout the

house, or they can be wired in a star configuration like the telephone and TPBus wiring. The star wiring will require more cable, but will provide greater flexibility. In either case, the wiring should originate at a point convenient for connection to outside video (antenna or cable television) and near the TPBus distribution panel.

As with the telephone and TPBus wiring, there should be sufficient slack in the cables behind the wall so that they can be accessible at a later time.

One cable of the dual system can be used initially as a normal television distribution system as is typically done in new homes. When the time comes to install the CXBus, the initial connector will be replaced by a CXBus receptacle which will have provisions for using both cables.

Other CEBus[™] Media - The two other communication paths used by CEBus[™], infrared (IRBus) and radio (RFBus) do not have any unique requirements that impact the construction of the house.

Caveat - Please note that the EIA Home Automation Standard is still being drafted and subject to change. These recommendations are based on knowledge of the developing standard's requirements at this time. Please do not incur additional costs in reliance upon this non-final standard.

APPENDIX 5
SMART HOUSE WIRING TOPOLOGY

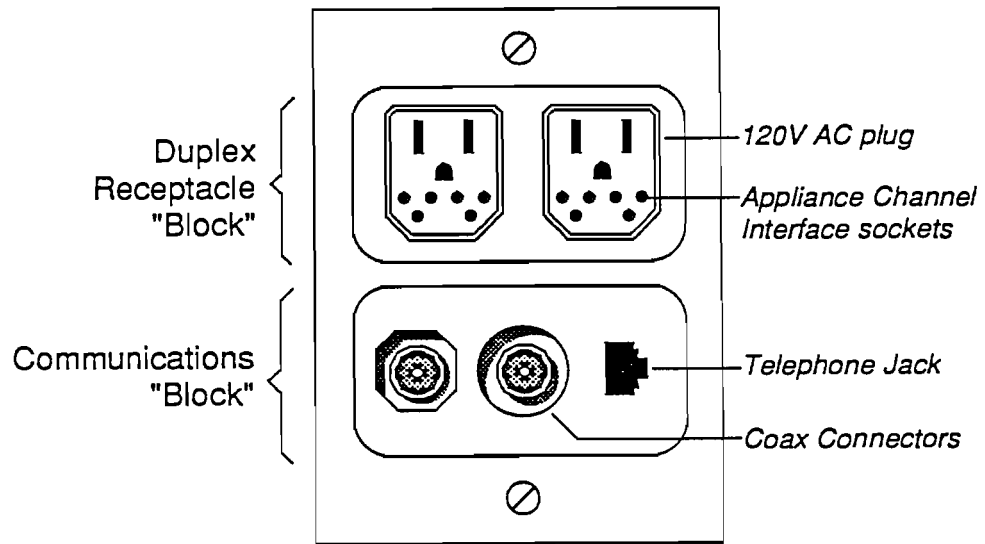


Figure 12, Convenience outlet with communications block and duplex receptacle block

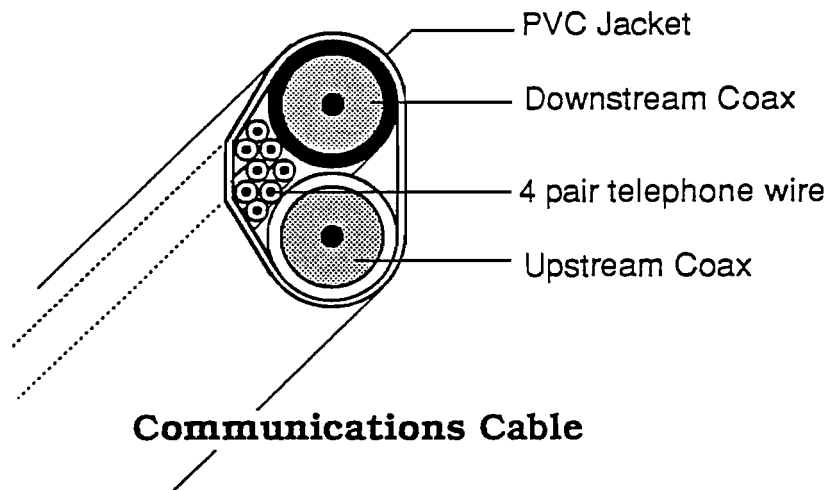


Figure 13, Jacketed communications cable contains dual coax and four telephone pairs

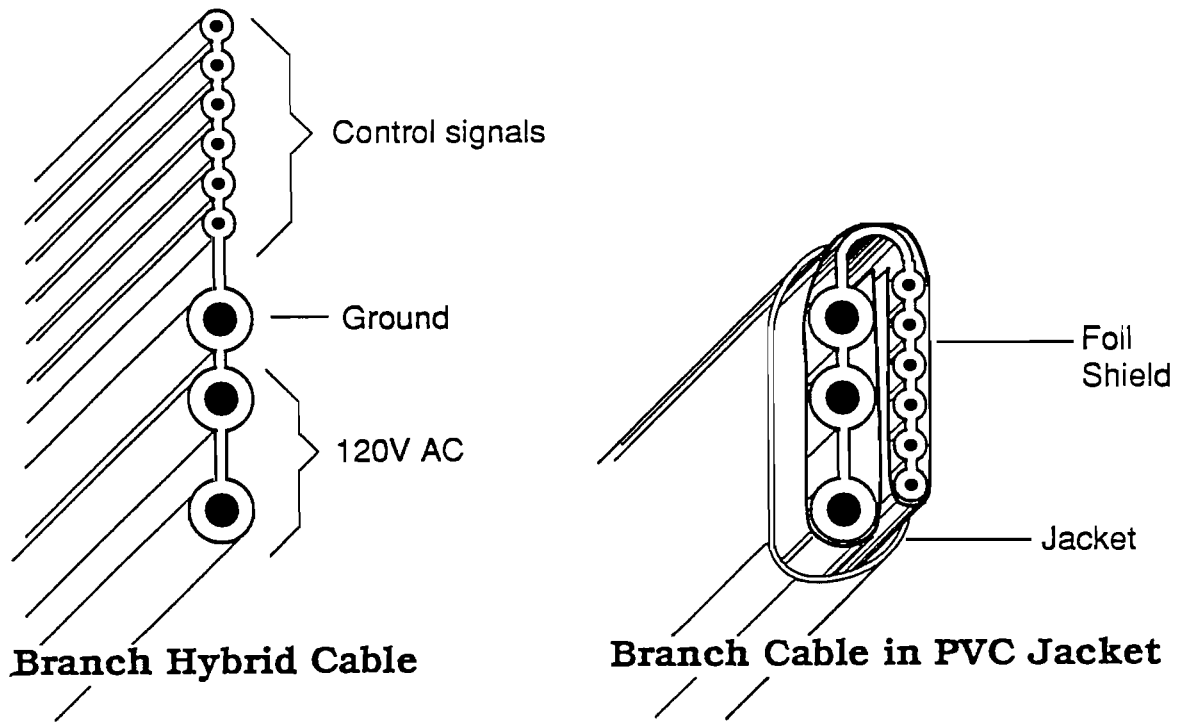


Figure 10, Branch ribbon cable carries 120V AC as well as low voltage wiring for branch communications

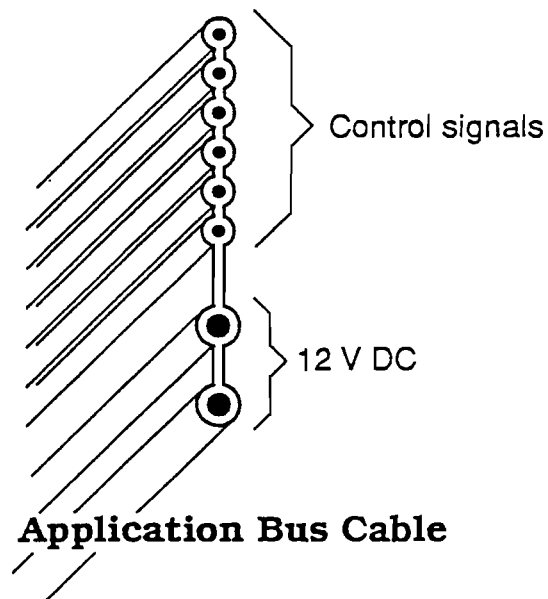


Figure 11, Application bus cable for low voltage DC devices

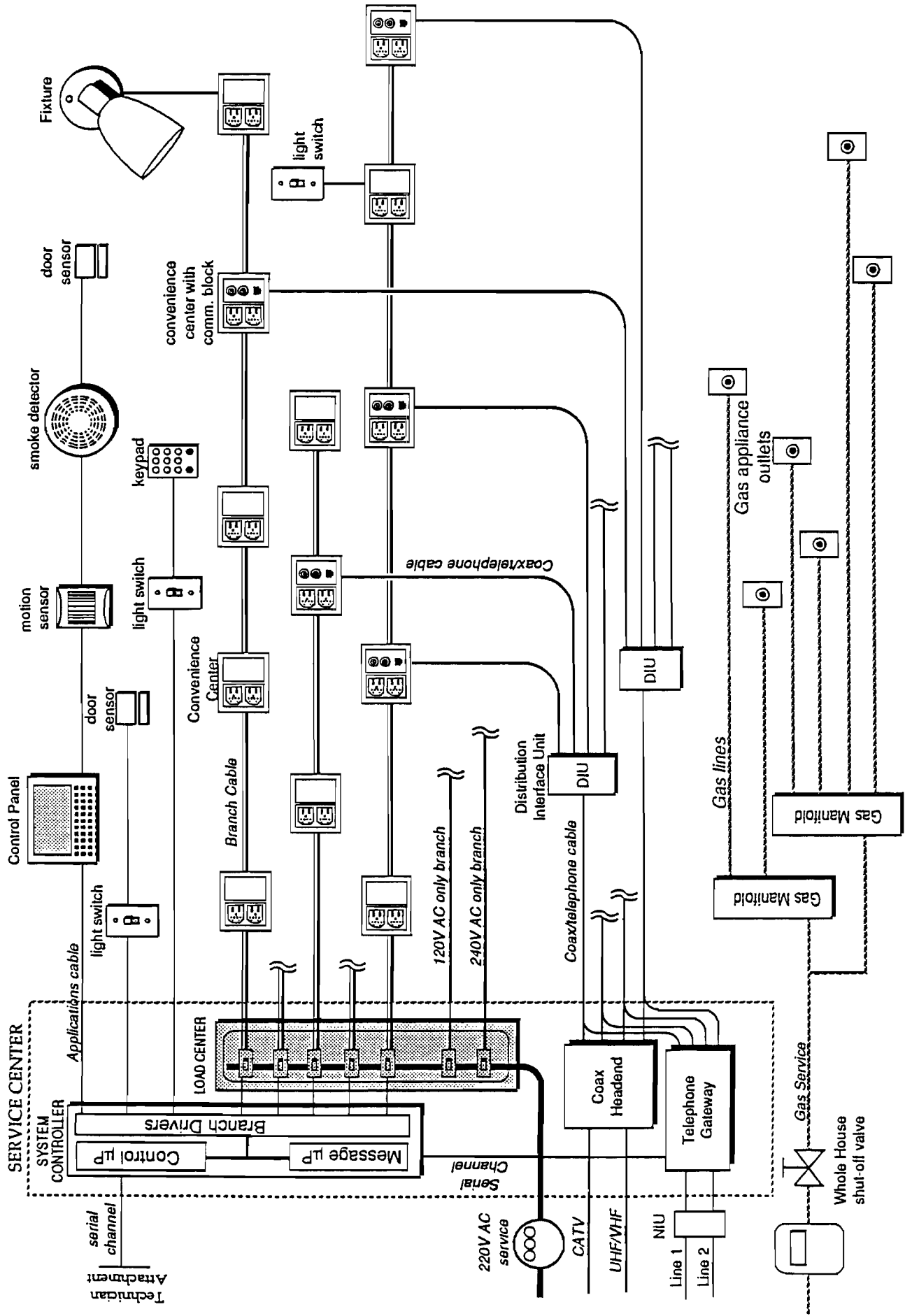


Figure 9, Smart House System Topology

APPENDIX 6
ECHELON "LON" NETWORK TOPOLOGY

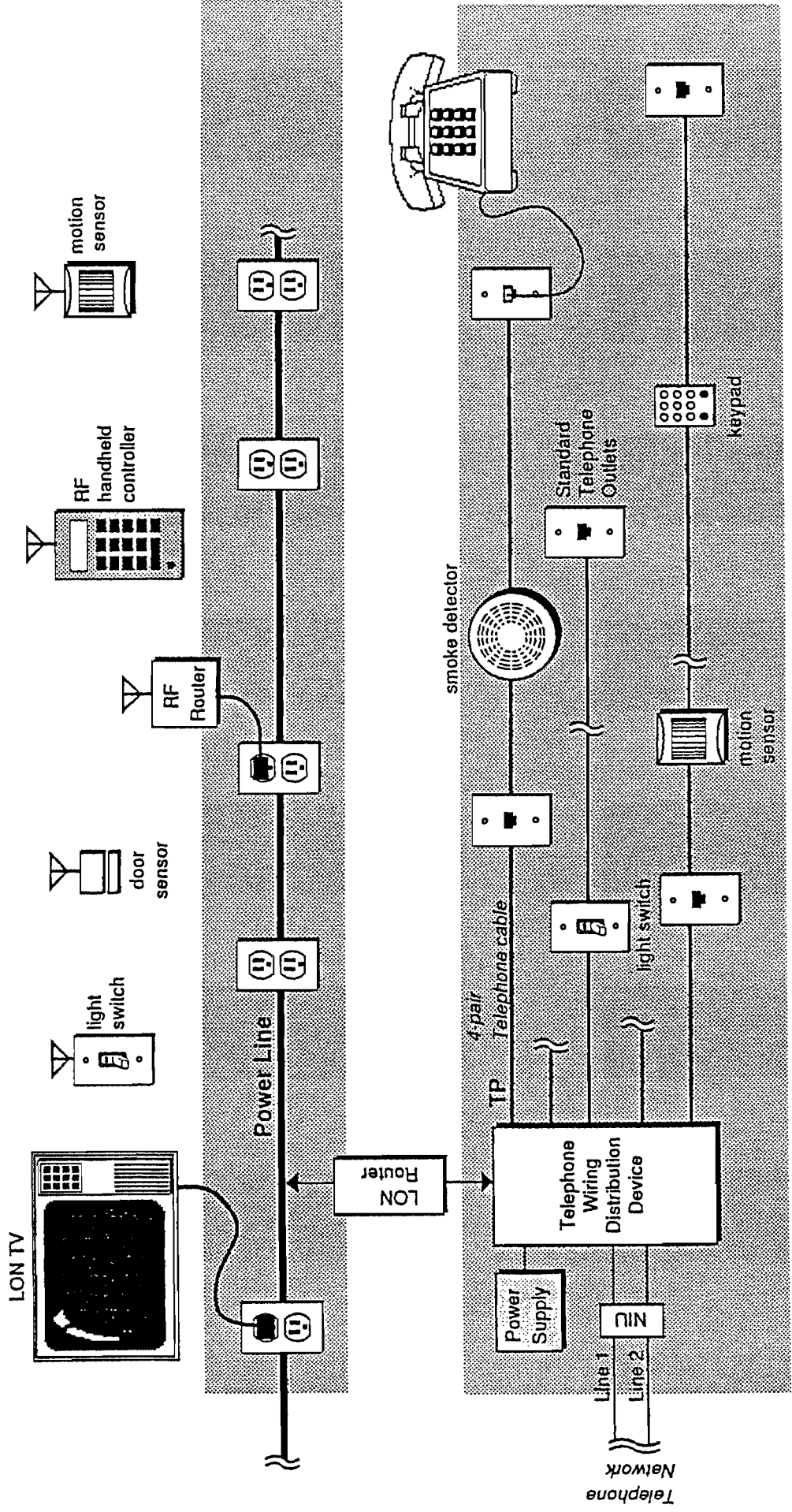


Figure 7, Possible LON network topology

APPENDIX 7

SQUARE D "ELAN" PRODUCT - DESCRIPTION



BY SQUARE D

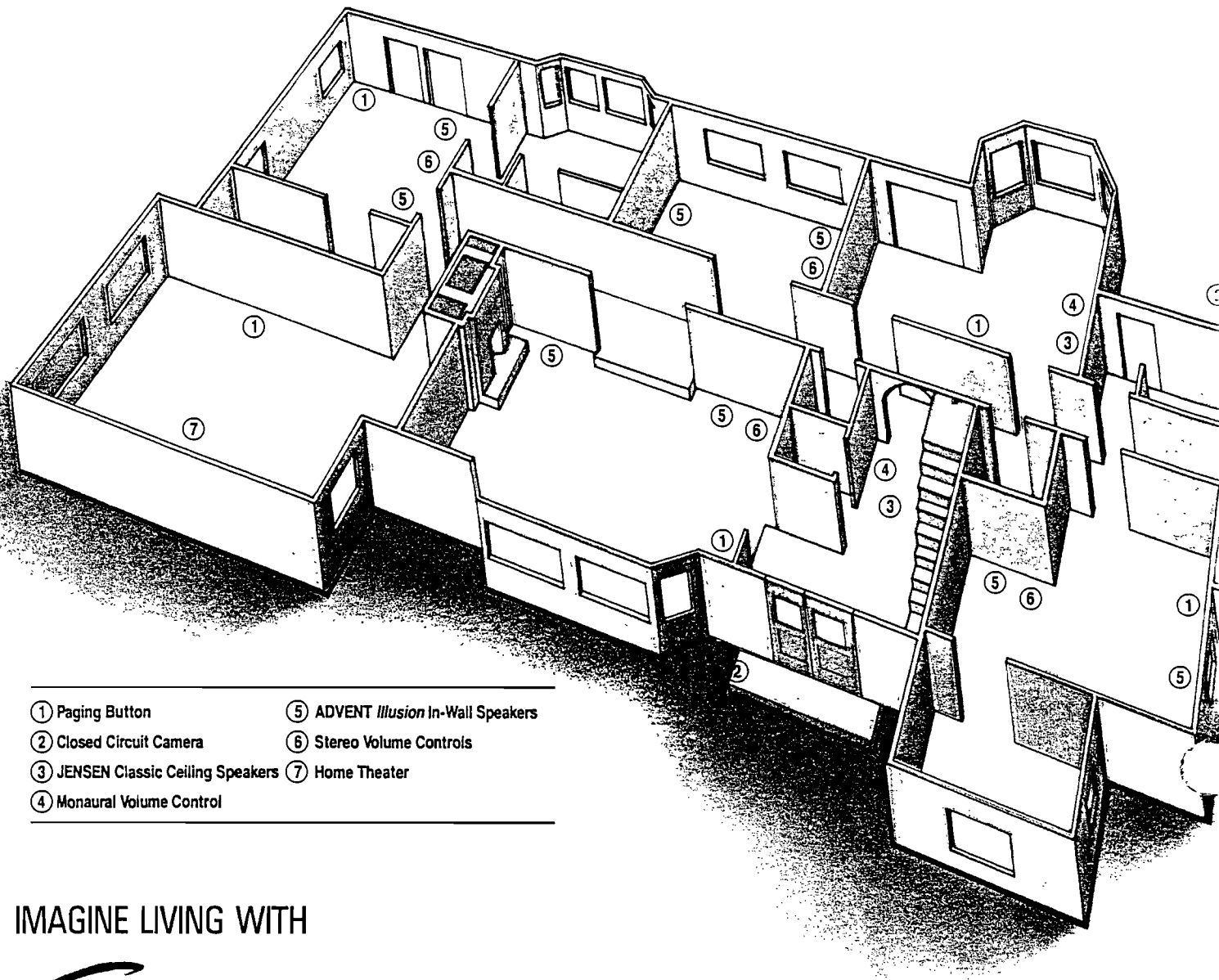
We Respond.™

ELAN and TRILLIANT are trademarks of Square D Company.
OO, HOMELINE, QWIK-OPEN, and VISI-TRIP are registered trademarks of Square D Company.
Advent and Jensen are a registered trademarks of International Jensen Incorporated.



SQUARE D COMPANY
DISTRIBUTION EQUIPMENT BUSINESS

Dedicated to Growth • Committed to Quality



-
- | | |
|-----------------------------------|---|
| ① Paging Button | ⑤ ADVENT <i>Illusion</i> In-Wall Speakers |
| ② Closed Circuit Camera | ⑥ Stereo Volume Controls |
| ③ JENSEN Classic Ceiling Speakers | ⑦ Home Theater |
| ④ Monaural Volume Control | |
-

IMAGINE LIVING WITH

*Elan*TM

- ▶ Imagine using your VCR to view a tape from any TV in the house
- ▶ Imagine using your phone to page the family to dinner
- ▶ Imagine using your stereo to provide music to any room in the house
- ▶ Imagine using your TV and stereo for thunderous movie-quality sound in your own home theater

That's living with ELAN!

What is ELAN?

A HOUSE-WIDE SYSTEM FOR BETTER LIVING

The ELAN Advanced Home Network reorganizes the way a house is wired and uses a special Square D distribution center to coordinate telephone, audio, video and electrical services in the home for unmatched convenience.

The ELAN system is installed during construction and provides increased capabilities without adding significantly to the home's cost. Optional product packages can be added at any time to add even more value and convenience.

No home that uses telephones, audio systems, televisions and VCRs should be without the benefits of the ELAN Advanced Home Network.

INTRODUCING THE ELAN™ A

9 Reasons you should be building with ELAN

1. **ELAN distinguishes your homes from your competition.** The ELAN system adds a new level of distinction that will set your homes apart from homes that don't offer the ELAN system.
2. **ELAN adds value to your homes.** The ELAN system lets homeowners take full advantage of the phones, stereo, TVs, VCR and other things they already use. The capabilities of the ELAN system add convenience and value to the home.
3. **ELAN helps sell your homes faster.** With the distinction and added value enjoyed by an ELAN home, you have an advantage that will help sell your homes faster.
4. **ELAN is profitable.** The ELAN system means additional profits for you. And, with the optional enhancements, you have the potential to sell up and make even more.
5. **ELAN has a low cost, but high perceived value.** Homeowners perceive high value in the ELAN system. That makes your selling job easier and helps you maintain your margins. The modest price of ELAN will also help it become a standard for new homes.
6. **ELAN is state-of-the-art.** How your customers perceive you is important. ELAN positions you as a leading-edge builder, offering the latest and most advanced home options.
7. **ELAN is warranted up to three years.** When installed with a Square D circuit breaker load center and surge protection,

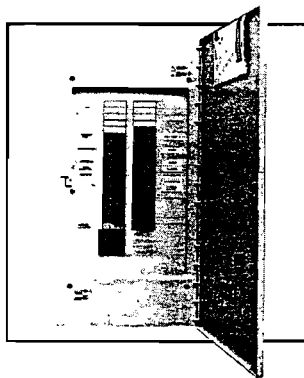
A home with a Square D load center is a better home

Square D means unsurpassed protection and value

Electrical protection in the home is one place it doesn't make sense to compromise. That's why quality builders and electrical contractors choose Square D.

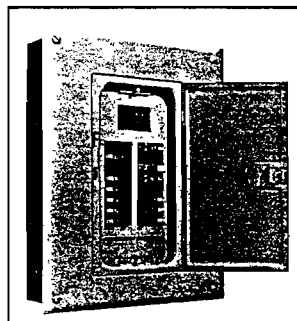
Each year, more homes are built with Square D circuit breakers and load centers than any other. That's because Square D circuit breakers offer unsurpassed electrical protection. And Square D load centers provide the quality and features that make them the industry's best value.

Square D is also the only manufacturer to offer a unit to meet virtually any situation:



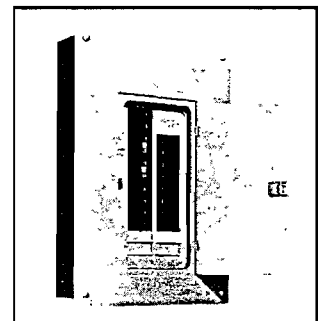
TRILLIANT™ Home Power System

New! The most innovative design in years. Designed especially for residential applications, TRILLIANT offers features and benefits not found on any other load center. The attractive cover design makes it the perfect compliment to the ELAN system.



QO® Load Center

The industry standard for over 35 years in quality residential and light commercial applications. QO circuit breakers are famous for their QWIK-OPEN® breaker mechanism and exclusive VISI-TRIP® indicator that makes it easy to spot a tripped breaker.



HOMELINE® Load Center

Don't compromise your reputation to meet competitive situations. HOMELINE breakers and load centers are designed to match the features of other load centers while still providing traditional Square D quality and superior circuit protection.

ADVANCED HOME NETWORK

the ELAN system is warranted by Square D for three years.

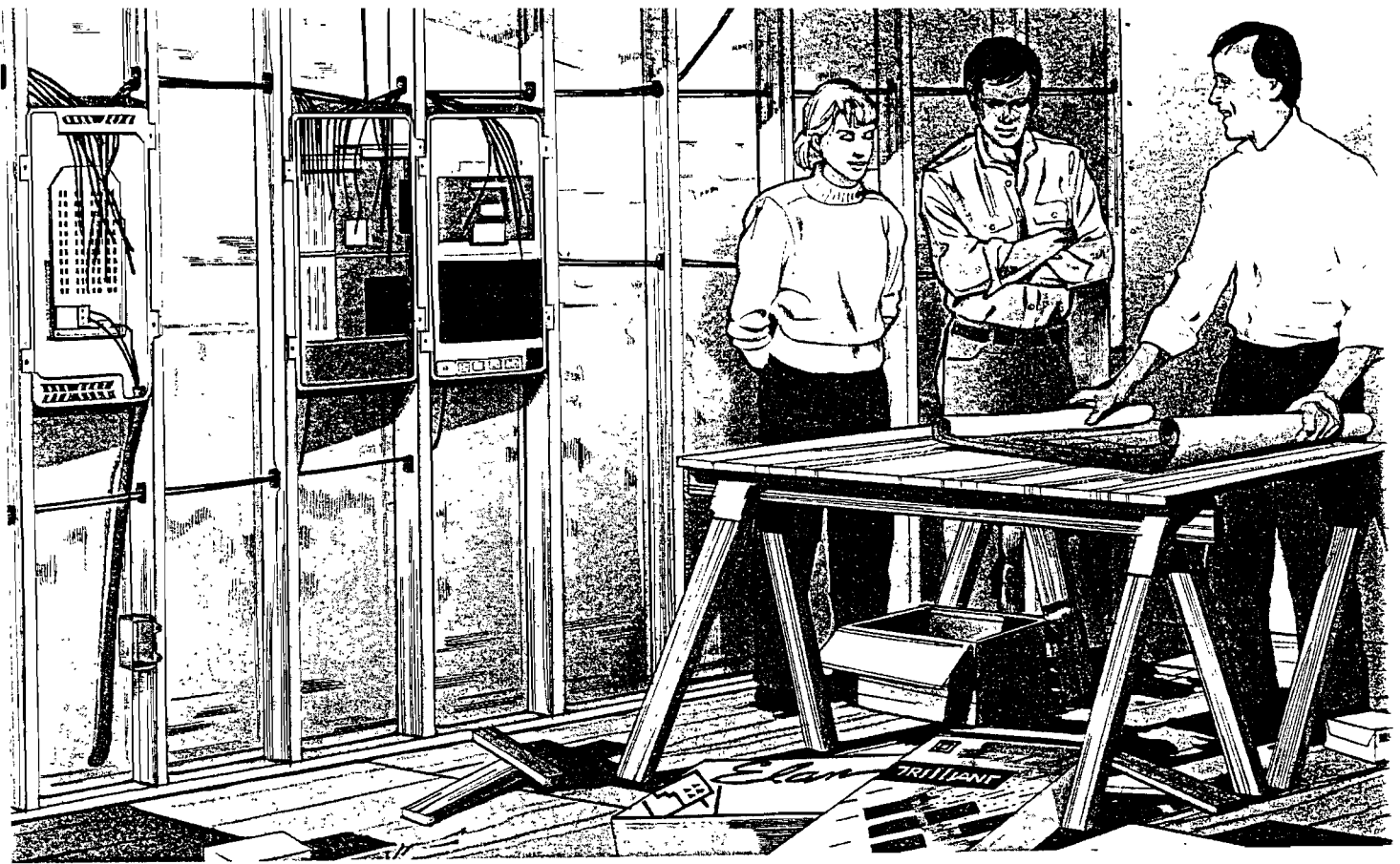
8. **ELAN is backed by Square D.** Square D products rate first in brand preference among home builders and electrical contractors. That's because Square D provides unmatched circuit protection, quality and service. Why risk your reputation with anything less?
9. **ELAN is what homeowners want.** When homeowners see a demonstration of the ELAN system, they're sold. And offering what the customer wants is your best guarantee of success.

ELAN System Capabilities

	Basic System	Advanced System Options
Video	Route VCR signal to any TV in the house.	Add closed circuit cameras for security, convenience.
Audio	Use your stereo to distribute sound throughout house.	Upgrade to high quality Advent® stereo speakers in desired areas. Add home theater sound package.
Telephone	Handle 3 incoming lines. Page from any phone.	Add enhanced phone capabilities.

ELAN Product Features and Benefits

Feature	Benefit
Complete system	Carefully matched components assure proper performance.
Established technology	Proven technology prevents unnecessary complexity.
Expandable	Options can be added during construction or after. New options can be added as they're developed.
Jensen and Regal components	Square D partnership with market leaders for audio and cable components, plus our own leadership in the electrical market, assures a top quality product.
Elegant appearance	Can be installed in more accessible areas. Matches TRILLIANT cover.



Questions Builders Ask About ELAN

"Is this the Square D version of 'SMART HOUSE'?"

No, the ELAN system is not a home automation system. It doesn't do anything with centralized control (you can't turn the oven on from your car phone). The ELAN system is a distribution center and wiring system that takes advantage of phones, audio and video equipment in the house but uses established technology.

"What are the competitors to the ELAN system and how do they compare?"

Today, there are no directly comparable products. Some of the features of the ELAN system are available in various home automation systems. These systems, though, are more complex and expensive than ELAN. It's also possible to achieve some of the same features by piecemealing various commercially available components together in a wire-by-wire installation. ELAN is the only organized approach to home wiring with a central distribution center and carefully matched components.

"What if I'm in a price sensitive market? Can I justify the cost of the ELAN system?"

The basic ELAN system is priced very modestly. The basic system adds about 2%

to the cost of a \$100,000 home. Amortized over a 30 year mortgage the ELAN system is only a few dollars a month. For this minimal investment the ELAN system adds significant value in the mind of the home buyer and helps distinguish your home from those without and ELAN system.

"Won't ELAN compete against other upgrades?"

To some extent, yes. The key to maximizing the potential of ELAN is to install the basic system in every house. That adds significant value to the home buyer and allows the buyer to select the options they want.

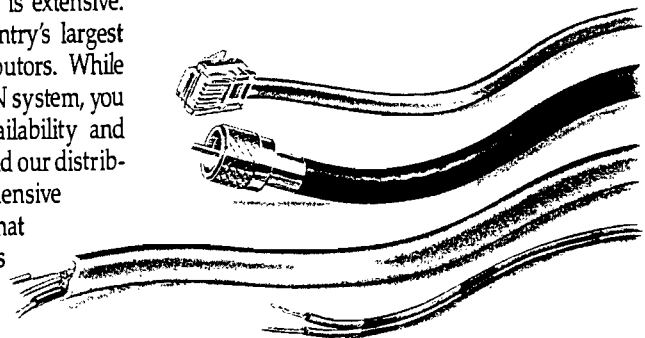
"What kind of support is Square D providing for ELAN?"

Square D support for ELAN is extensive. First, Square D has the country's largest network of electrical distributors. While they won't all carry the ELAN system, you can be assured of local availability and support. Second, Square D and our distributors will provide a comprehensive training program to assure that authorized ELAN contractors are capable of high quality installation. Third, Square D is

supporting the introduction of ELAN with a strong promotional program that includes advertising, direct mail, display materials and more. Finally, ELAN will be backed by a toll free telephone support line and the largest sales and support staff in the electrical business.

"How do I get started?"

Just contact your local authorized Square D ELAN distributor, the local Square D sales office, or request an information package by calling 1-800-767-0914, ext. 115.



GENERAL

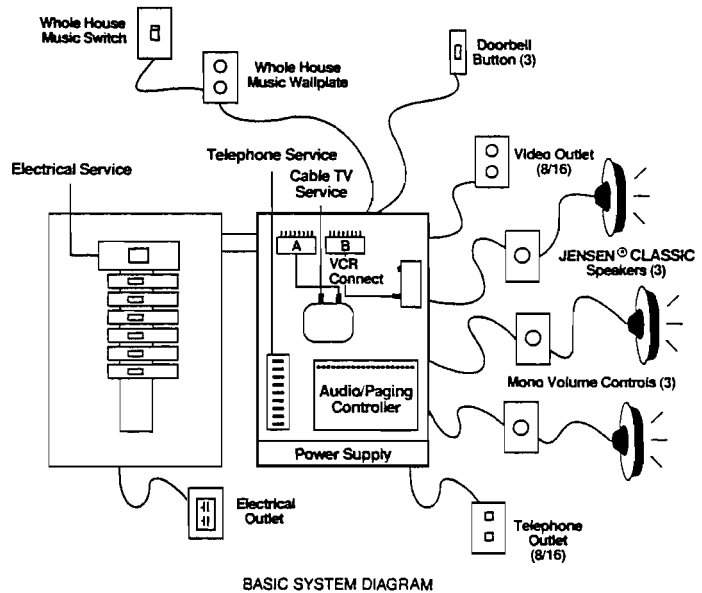
The ELAN™ Advanced Home Network is a “reorganized” approach to home wiring design that provides an enhanced telephone/intercom system, audio system, and video wiring system. The network’s single open-wiring format uses standard wire and cable and existing wiring and installation techniques without adding significant cost to new home construction. Once installed, the homeowner can add components, such as a video monitoring system, without additional wiring expense.

A central “hub” distributes telephone, video, and audio services to jacks, outlets and speakers throughout the home, providing immediate access to those services.

The telephone system consists of an eight-conductor cable that allows up to three incoming lines. The telephone system is connected to the audio system providing whole-house paging from standard telephones.

Using the homeowner’s stereo, the audio system distributes high quality sound throughout the home. Door chime sound is also provided.

The dual-coax video wiring system provides flexible routing of TV, VCR and other video signals to all outlets.

**Basic Components**

- ELAN Box
- ELAN Basic System:
 - Distribution Center
 - Jensen® Classic Speakers
 - Monaural Volume Controls
 - Telephone Paging Buttons
 - VCR Hook-up Kit
 - Whole House Music Switch
 - Whole House Wall Plate
 - Homeowner’s Manual

Options

- Elan Home Theater System:
 - Home Theater Sound Package
- ELAN Advanced Video System:
 - CCTV Camera Package
 - Add-on CCTV Camera
- ELAN Advanced Audio System:
 - Jensen Classic Speakers
 - Advent® Illusion™ Speakers
 - Volume Controls



ELAN™ Basic System and ELAN Box

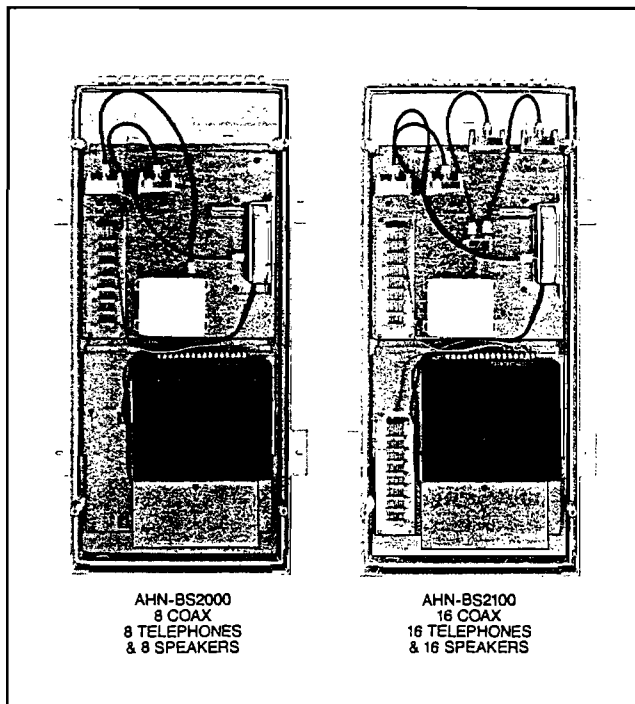
Basic System AHN-BS2000
 AHN-BS2100

Box AHN-B2000

The ELAN Basic System and the ELAN Box are the minimum product components required for the network. The Basic System comes in two models:

- Model AHN-BS2000—provides 8 coax outlets, 8 telephone outlets, and a maximum of 8 speakers
- Model AHN-BS2100—provides 16 coax outlets, 16 telephone outlets, and a maximum of 16 speakers

The ELAN Box is required by both basic system models and is installed at rough in. The distribution center and remaining components of the basic system are installed at trim out.



Components

- Basic System (AHN-BS2000/AHN-BS2100)
- Box (AHN-B2000)
- Cover
- Distribution Center Interior
- 3 Jensen® Classic Speakers with Mounting Hardware
- 3 Monaural Volume Controls
- 4 Telephone Paging Buttons
- 1 VCR Hook-Up Kit
- 1 Whole-House Music Wall Plate
- 1 Whole-House Music Switch
- Coax Wall Plate Terminators
- Homeowner's Manual

Features

- Distributes Telephone, Video and Audio Signals
- Uses Homeowner's Stereo for Music
- Provides Whole-House Paging from Standard Telephones
- Distributes VCR Signals to All Televisions
- Provides Door Chime over Audio Speakers

Specifications

- General
 - Power: 120Vac @ 2 Amps
 - Box Size: 14 $\frac{3}{8}$ "W-32 $\frac{1}{4}$ "L-4"D
- Telephone
 - Button Size: 1 $\frac{7}{8}$ "W-3 $\frac{1}{2}$ "L-1 $\frac{1}{8}$ "H
 - Line 2 Interface: 24Vdc, 600 Ω
- Video
 - A-Side Amplifier
 - CATV: Single Output
 - Freq. Resp.: 50-550 MHz
 - Gain: 17dB Min.
 - EMI Isolation: 100dB Min.
 - Noise Figure: 7dB Max.
 - Cross Modulation Distortion: -75dB Max.
 - Hum Modulation: -65dB Max.
 - Power Input: 24Vac Nominal
 - B-Side Amplifier
 - Type: VHF/UHF Dual Output
 - Switchable FM Trap
 - Freq. Resp.: 54-890 MHz
 - Gain: 14-26dB (Adjustable)
 - Noise Figure: 6.5dB Max.
 - Power Input: 24Vac Nominal
- Audio
 - Speakers
 - Max. Number of Speakers: AHN-BS2000 (8) and AHN-BS2100 (16)
 - Classic Speaker Size: 10"W-10"L-3"D
 - Speaker Type: Two-Way Coax with 6 $\frac{1}{2}$ " Woofer and $\frac{1}{2}$ " Tweeter
 - Max. Speaker Wattage: 60 Watts RMS, 150 Watts Peak
 - Min. Load: 4 Ω with Freq. Resp. 100Hz to 16KHz
 - Amplifier
 - Amplifier Output Min.: 60 WPC into 1 Ω
 - Freq. Resp: 20Hz to 20KHz, \pm 3dB
 - 85dB Signal-to-Noise Ratio ("A" Weighted)
 - Thd: 0.1% (1KHz into 4 Ω @ 30 Watts)
 - Input Impedance: 100K Ω
 - Input Sensitivity: .1V to 1.4V (Adjustable)
 - Amplifier Load: 34 VCT to 1 Amp

THE Bright HomeSM

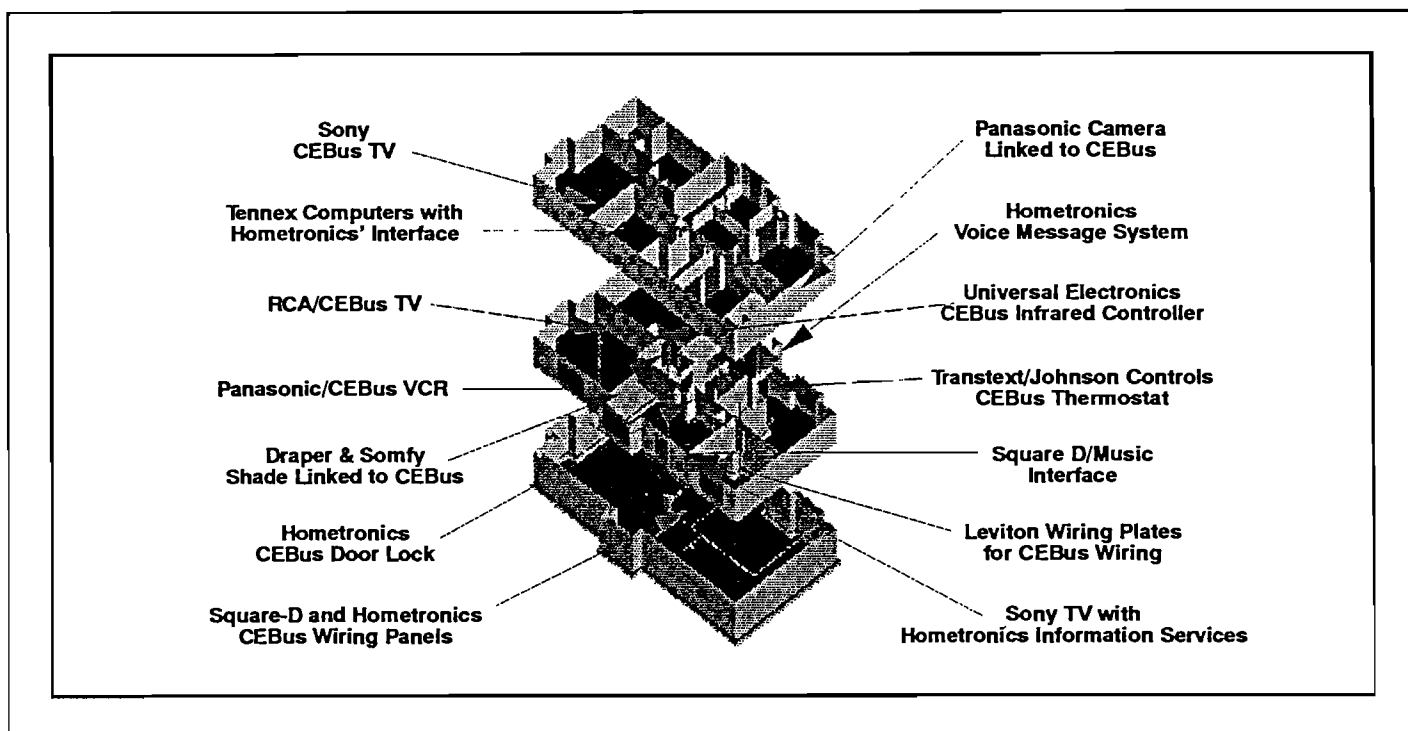
As Outfitted For CEBus

by

THE

Hometeam

ProjectSM



"World's First Public CEBus Demonstration Home"

For Information Contact:

**The HomeTeam Project
c/o Hometronics, Inc.**

Administrator

(317) 545-6239 / Fax (317) 545-6237

APPENDIX 8
INFORMATION SOURCES BIBLIOGRAPHY

INFORMATION SOURCES

1. Smart Lifestyles Ltd.
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2. Parks Associates
Contact: Tricia Parks
5310 Harvest Hill Road
Suite 235, Lock Box 162
Dallas, Texas 75230-5805
Tel: (214) 490-1113
Fax: (214) 490-1133

3. Electronic Industries Association
Cebus Effort
EIA
2001 Pennsylvania Avenue N.W.
10th Floor
Washington, DC 20006
Tel: (202) 457-4900

4. The Smart House Limited Partnership
400 Prince Georges Blvd.
Upper Marlboro, MD
20772
Tel: (301) 249-6000
Fax: (301) 249-3096

5. Echelon Corporation
4015 Miranda Avenue
Palo Alto, CA 94304
Tel: (415) 855-7400
Fax: (415) 855-6153

6. X-10 (USA) Inc.
185A LeGrand Avenue
Northvale, New Jersey 07647
Tel: (201) 784-9700

7. CABA (Canadian Automated Building Association)
Contact: Alan D. McKinley
1200 Montreal Road
Building M-59
Ottawa, Ontario K1A 0R6
Tel: (613) 990-7407
Fax: (613) 954-0483

8. Home Automation Association
Contact: Nicholas A. Pyle
1223 Potomac Street, NW
Washington, DC 20007
Tel: (202) 333-8190
Fax: (202) 337-3809

LE BUS DOMOTIQUE

**LE
BUS
DOMOTIQUE**

Précâbler pour l'avenir

Rédigé par
Ronald B. Dewhurst
Vice-président et directeur de
Smart Lifestyles

AVERTISSEMENTS

Ce projet a été réalisé grâce à une subvention de la Société canadienne d'hypothèques et de logement aux termes du Programme d'encouragement à la technologie du bâtiment résidentiel. Les opinions exprimées dans ce document sont celles de l'auteur et ne représentent pas celles de la Société.

Le présent document expose les opinions de l'auteur. Les idées qui y sont véhiculées ne visent pas à promouvoir un standard par rapport à un autre ou l'opinion de toute compagnie que ce soit. Les avis n'y sont émis qu'à titre de renseignement et l'auteur n'assume aucune responsabilité quant à la perception et à l'utilisation de cette information.

RÉSUMÉ

La maison automatisée n'est désormais plus du domaine de la science-fiction. Il est maintenant facile de se procurer des dispositifs commandés par ordinateur qui règlent la température, la ventilation, l'éclairage électrique et naturel, et bien d'autres installations domestiques. Les consommateurs avertis recherchent pour leur foyer des dispositifs électroniques entièrement automatisés tels que les systèmes de sécurité «intelligents». L'industrie de l'électronique grand public reconnaît d'ores et déjà que l'habitation totalement automatisée est une réalité de plus en plus présente sur le marché qui deviendra, un jour, la norme pour les nouveaux ensembles résidentiels.

Mais pour que ce scénario soit possible, il importe de faire baisser le prix du câblage nécessaire à l'installation de ces dispositifs. Bien que les câbles pour de l'équipement standard comme le téléphone et la câblodistribution soient déjà prévus au stade de la conception des habitations modernes, le câblage requis pour les réseaux intégrés de communication et de commande est coûteux et donc peu abordable compte tenu des contraintes budgétaires du consommateur moyen. Parmi les facteurs entraînant ces coûts élevés, il y a le fait que les câbles et la technologie utilisés dans les maisons traditionnelles ne sont pas compatibles avec les exigences de la plupart des systèmes électroniques perfectionnés de commande et de communication.

Pour que le câblage résidentiel puisse répondre aux besoins actuels et futurs des consommateurs, dont les attentes augmentent rapidement, il faudra mettre au point des réseaux intégrés. Une société américaine, la Smart House Limited Partnership, admet la nécessité de créer un produit de précâblage pour réseaux intégrés. Smart Redi, un produit de précâblage Smart House, a été mis au point en vue de répondre à ce besoin. Plusieurs autres initiatives privées ont été lancées pour concevoir des installations

de précâblage destinées aux réseaux de communication intelligents des maisons automatisées. La participation du Canada à ces efforts s'est concrétisée avec la conception du «bus domotique».

L'entreprise qui a mis au point le bus domotique a adapté à ses besoins plusieurs produits existants et a conçu un prototype de câble et de prise électrique destinés à être installés à «Telosky Village», un nouvel ensemble d'habitation construit en Colombie-Britannique. Les concepteurs du

bus domotique avaient pour objectif de produire un système simple et économique en ayant recours à la technologie existante. Le produit issu de ce projet peut alimenter en électricité les appareils électriques traditionnels tout en permettant la mise en place économique de dispositifs

perfectionnés de commande et de communication pouvant être reliés à des systèmes et à des réseaux extérieurs. Il fallait que le produit puisse être

facilement installé par des entrepreneurs spécialisés en électricité et en circuits de basse tension et soit en mesure de répondre aux besoins actuels

et futurs de l'habitation en matière d'alimentation électrique.

Ce projet, maintenant réalisé, a prouvé la faisabilité d'un réseau intégré intelligent. Les responsables du projet se sont déclarés très satisfaits des résultats tant pour les progrès qu'il a permis d'accomplir dans le

domaine de la domotique que pour la mise en marché réussie de l'ensemble
Telosky Village.

TABLE DES MATIÈRES

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CONCLUSIONS	V

SECTION I - RÉSUMÉ

Ronald B. Dewhurst
Secrétaire général
Directeur

Diplômé de troisième cycle en électronique et informatique, Ronald B. Dewhurst oeuvre depuis huit ans dans le domaine de la domotique en tant que consultant, concepteur et responsable de la mise en oeuvre. Ancien président de la firme Maple Ridge Compuhome et directeur de Adaptable Housing Ltd., M. Dewhurst occupe aujourd'hui le poste de vice-président de la recherche et du développement chez Smart Lifestyles Ltd., la plus grande entreprise de domotique au Canada.

M. Dewhurst est réputé comme l'un des pionniers de la mise en oeuvre de la domotique en Amérique du Nord. Jouissant d'une renommée mondiale grâce à des initiatives comme Telosky Village, le premier ensemble de démonstration domotique au Canada, il collabore avec des chefs de file en innovation tels Unity Systems, Custom Command, Smart House et Square D pour lancer la haute technologie de la domotique sur le marché.

Patrick Simpson
Président
Directeur

Après avoir occupé divers emplois qui l'ont mené de l'immobilier à l'aménagement foncier à titre de vice-président de Hollyglen Holdings, M. Simpson se joint à l'industrie de la domotique en 1988. Cofondateur de Adaptable Housing, M. Simpson agit comme président de cette société prospère nouvellement créée qui a innové dans le secteur de la commercialisation, du développement et de la mise en oeuvre de la domotique au sein de l'industrie de l'habitation. «Telosky Village», la plus importante réalisation de Adaptable Housing, s'est taillé une notoriété internationale pour son concept révolutionnaire se distinguant par son précâblage et l'adaptabilité de ses caractéristiques axées sur l'accessibilité.

M. Simpson est aujourd'hui cofondateur et vice-président de l'exploitation chez Smart Lifestyles, l'une des plus importantes sociétés de domotique au Canada. Il y poursuit ses efforts en vue de faire adopter la technologie des maisons intelligentes.

SECTION II - CONTEXTE

Dans l'industrie de l'électronique grand public, on s'intéresse de plus en plus à la domotique. Mais qu'est-ce donc que la domotique?

C'est l'ensemble des produits et systèmes communicants dotés de microprocesseurs dont on équipe une habitation. Cette définition s'applique à un large éventail de dispositifs et de services domestiques, notamment à la sécurité, aux communications, au chauffage, à la ventilation, à la climatisation, aux loisirs, à l'éclairage, aux appareils ménagers et à l'énergie.

Ces sous-systèmes domestiques «intelligents» peuvent, grâce à leurs capacités de communication, exploiter l'information recueillie par un ou plusieurs autres dispositifs ou sous-systèmes en vue d'optimiser leurs fonctions propres et ainsi en faire bénéficier l'occupant.

Considérons, par exemple, un régulateur de chauffage intelligent qui est «informé» par un détecteur de mouvements du dispositif de sécurité que quelqu'un entre dans une pièce. Dès qu'il perçoit que la pièce est occupée, le sous-système de sécurité le signale au régulateur de chauffage, qui met le chauffage en marche dans ce secteur. Quand la pièce est de nouveau inoccupée, le même procédé de communication replace le chauffage en mode économie.

Spécialisée en marketing de haute technologie, la firme-conseil Rose Associates, de Los Altos, en Californie, allègue ce qui suit dans son nouveau rapport de 445 pages portant sur les semi-conducteurs et les composantes électroniques de l'habitation intelligente :

Grâce aux derniers progrès technologiques comme le système de commande réparti intelligent et la modulation à spectre étalé, les composantes électroniques de l'habitation intelligente promettent d'être le prochain marché d'importance pour les fabricants de semi-conducteurs et d'éléments de systèmes électroniques. Cette étude me convainc encore plus que jamais que les composantes électroniques de l'habitation intelligente constitueront le produit de la prochaine décennie.

Le marché de l'habitation est au seuil d'une vaste révolution en matière de technologie résidentielle. Que lui faudra-t-il en tout premier lieu pour franchir ce seuil? Tout simplement la mise au point d'un réseau de communications à l'intérieur de l'habitation qui convienne aux logements existants et neufs. C'est précisément l'objectif du «bus domotique».

SECTION III - OBJECTIFS

Pour favoriser une croissance rapide du marché de la domotique, le réseau de communications doit être le plus simple possible et faire appel autant que possible aux médias et à la technologie du câblage modernes. Le modèle du bus doit être agencé au préalable et faire peu appel au soutien et à la conception de système.

Ainsi conçu, ce bus formera un réseau économiquement viable et facilement installé par des entrepreneurs spécialisés en électricité et en circuits de basse tension. Ce produit affichera les caractéristiques suivantes :

- ° système simple doué d'une capacité d'expansion considérable ayant recours aux câbles et aux méthodes d'installation modernes;
- ° système convenant à la fois au marché des maisons existantes et des maisons neuves;
- ° système souple permettant l'installation économique de la plus simple commande d'éclairage jusqu'au système central de commande domestique le plus complexe constitué de produits provenant de compagnies et de secteurs divers;
- ° modules immédiatement utilisables permettant d'ajouter des éléments au fil des besoins de l'occupant;
- ° réseau de commande et de communications pouvant facilement être relié aux systèmes et aux réseaux extérieurs.

Les réseaux domestiques, par leur création, leur conception et leur mise en service, sont les catalyseurs de l'industrie.

SECTION IV - CONCEPTION, MISE EN SERVICE ET ESSAI DU SYSTÈME

CONCEPTION

Jusqu'à présent, tous les réseaux électroniques domestiques ont été la chasse gardée d'entreprises domotiques comme Unity, Home Automation Inc., Custom Command, etc. En effet, celles-ci utilisent leurs propres composantes d'automatisation comme les paires torsadées, les courants porteurs et les câbles coaxiaux. Des représentants hautement spécialisés de chaque entreprise conçoivent, mettent en service et installent ces réseaux exclusifs. Cette stratégie de spécialisation ne peut que nuire à la croissance de l'industrie.

Comme nous l'avons déjà mentionné, la condition fondamentale pour stimuler la croissance et l'acceptation de l'industrie est la mise sur pied de vastes réseaux qui permettent à des produits d'industries et d'entreprises diverses de communiquer entre eux par l'entremise de médias différents (paires torsadées, courant porteur, fréquences radio, fibres optiques, etc.).

Ces dernières années, plusieurs groupes se sont concertés en vue de créer des réseaux domestiques communs. Du point de vue du consommateur, ces efforts constituent des standards conçus d'un commun accord par les organismes participants. Jusqu'ici, aucun standard de facto n'a été élaboré ou établi à cause de la présence sur le marché de concepts concurrentiels.

En Amérique du Nord, les efforts de domotisation qui ont reçu le plus large appui sont les suivants :

1. CEBUS

- Standard technique de l'Electronic Industry Association (EIA) ou une série de documents.
- Standard de performance seulement; précise comment l'exploitation, le comportement et les caractéristiques nécessaires seront établis; crée un standard de communications multisupport touchant les produits et systèmes domestiques par l'entremise de médias différents.
- Créé en 1984.

2. SMART HOUSE

- Système de câblage électrique et de canalisations de gaz mis au point par Smart House Limited Partnership pour distribuer et commander l'énergie et les communications d'un bout à l'autre d'une habitation.
- Système de câblage et de commande intégré prêt-à-installer par les spécialistes de la société conceptrice.
- Axé sur les habitations neuves.
- Créé au début de 1987.

3. ECHELON

- Technologie de réseau polyvalente (réseau d'exploitation local) facilitant la communication entre différents secteurs du marché.
(auto <—> maison <—> avion <—> bâtiments)
- Même si la topologie du réseau n'est pas précisée, elle s'apparente à celle de CEBUS, acceptant comme lui les paires torsadées, les courants porteurs, les câbles coaxiaux, etc.
- Repose sur la technologie de la puce neuronale.
- Créé en 1988.

4. X-10

- Standard exclusif de transmission codée par fréquences radio et courants porteurs destiné aux communications et aux commandes dans toute l'habitation.
- Il s'agit du produit domotique le plus ancien et le plus courant.
- Peut être posé en rattrapage.
- Capacités élémentaires de communication et de commande.
- Créé en 1978.

Du point de vue de l'industrie, toutes les approches commerciales de ces standards sont différentes quant aux stratégies techniques et commerciales sur lesquelles elles reposent. Il demeure, cependant, qu'elles visent toutes la création d'un réseau pouvant faciliter la communication entre les différents sous-systèmes d'une habitation.

Pour la conception du bus domotique, nous avons pensé que la meilleure infrastructure de réseau ferait appel aux caractéristiques média de CEBUS, ECHELON et X-10. Ces trois modèles utilisent du câblage et permettent de respecter le critère d'abordabilité de notre projet. Nous n'avons pas retenu Smart House à cause de l'unicité de son réseau exclusif à câbles.

Après un examen des câbles offerts sur le marché et conformes à nos critères, nous avons choisi l'ensemble Tri-Con de la société Brand Rex. Ces câbles forment la base de la conception initiale de notre bus et de ses tableaux de commande. L'ensemble Tri-Con propose un câble à trois médias (PLBUS, CXBUS ET TPBUS) similaire au câblage spécialisé de Smarthouse, d'où ses caractéristiques avantageuses du point de vue commercial comme son ensemble de câbles préagencés, sa facilité d'installation et sa simplicité. (À noter que l'ensemble Smart-Redi n'était pas prêt lorsque nous avons conçu notre bus.)

Notre bus comporte un autre élément de conception important, soit le noeud de transit. C'est à ce niveau que convergent tous les câbles internes de l'habitation et tous les réseaux des services publics (électricité, téléphone, câblodistribution). Il fallait respecter les critères suivants à cet égard :

- emplacement central dans le logement pour faciliter la pose des câbles et favoriser l'économie;
- installation à cet endroit des tableaux de commandes, des sous-systèmes et des autres installations domestiques afin de permettre la communication et l'acheminement;
- pièce à environnement contrôlé;
- zone protégée pour assurer la sécurité;
- emplacement de tous les points de délimitation ou les terminaisons des services extérieurs.

(Le diagramme offre une représentation graphique du bus.)

MISE EN SERVICE

L'installation préliminaire du bus s'est faite conformément aux critères de conception pré-établis. Ainsi :

- Les ensembles de câbles Tri-Con (PLBUS, CXBUS ET TPBUS) et Duo-Con (CXBUS ET TPBUS) servent d'artères d'alimentation principales pour chaque pièce. La quantité d'artères principales est déterminée par les besoins de chaque pièce en réseau secondaire. En d'autres termes, nous avons déterminé les besoins en matière de sécurité, chauffage, ventilation et climatisation, d'audio/vidéo, de circuits de courants porteurs, etc. à partir desquels nous avons calculé le nombre d'artères d'alimentation principales requises.

- Les artères d'alimentation principales sont réparties selon une structure étoilée, partant du noeud de transit vers les boîtes Tri-Con et Duo-Con (terminaisons du noeud principal).
- Les circuits secondaires sont aussi disposés en étoile à partir des terminaisons du noeud principal par l'entremise d'une paire torsadée ou d'un câble à courant porteur standard permettant d'établir le réseau secondaire et les raccords aux appareils dans les pièces (p. ex. voie d'accès aux terminaisons du noeud principal pour le point de contact de sécurité).
- Un TPBUS pour noeud de transit et des boîtes pour CXBUS ont été installés en attendant la création de tableaux appropriés à câbles coaxiaux et à paires torsadées en tête de réseau aux fins de répartition des circuits. Le bus à courant porteur aboutit à un tableau de distribution standard à disjoncteur.
- Les terminaisons des câbles coaxiaux et téléphoniques (sur courant porteur) sont réalisées au moyen de connecteurs et d'autres dispositifs reconnus.

Après l'installation, nous avons vérifié la continuité et tenté de détecter des problèmes d'interférence et de mise à la terre en prévision du raccordement du dispositif.

ESSAIS

Nous avons mis en service et à l'essai un réseau, puis avons procédé comme suit pour brancher le bus et raccorder toutes les composantes :

- Les services de téléphone et de câblodistribution sont acheminés vers le noeud de transit aux fins de raccordement futur.
- Toutes les prises et les interrupteurs muraux servant de point de contrôle pour le courant porteur sont dotés de dispositifs de contrôle X-10.
- Tous les dispositifs de sécurité, les circuits de protection-incendie, etc. qui requièrent TPBUS pour la communication sont installés.
- L'unité de commande centrale, modèle 1503 de Home Automation Inc., est installée sur le noeud de transit, mettant en service les fonctions de commande et de communication sur TPBUS et PLBUS. (Au moment de la conception, il n'existait pas d'unité de commande centrale pouvant relier CXBUS afin de réaliser les commandes et les communications par ce média.)

° L'unité de commande centrale est entièrement programmée en vue de desservir toute l'habitation. Cette mise en service donne accès aux fonctions domotiques suivantes :

- commande de l'éclairage
- commande des installations de chauffage, de ventilation et de climatisation
- commande des appareils (lave-linge, sècheuse, chaîne stéréo, etc.)
- relèvement de la sécurité
- amélioration des communications (p. ex., utilisation du téléphone à l'intérieur ou à l'extérieur pour mettre en marche le dispositif de sécurité ou allumer une lumière)

Après la mise sous tension initiale, le système est étroitement contrôlé pour déceler tout problème de communication ou toute défaillance des dispositifs ou du réseau. Une fois les essais et le contrôle terminés, la maison de démonstration et toute l'installation du bus domotique a pu être ouverte au public.

CONCLUSION

Au moment de rédiger ce rapport, les maisons composant «Telosky Village», hôte du bus domotique, étaient mises en vente. L'opération s'est avérée un succès, puisqu'elles ont toutes été vendues.

Les objectifs du projet ont été atteints, dont celui de fournir au consommateur une infrastructure adaptable aux progrès futurs de la domotique. Entre autres, cette initiative :

- ° a été saluée à l'échelle locale et internationale pour ses caractéristiques de conception;
- ° a fait l'objet de reportages dans de nombreux médias tels la télévision et les revues spécialisées un peu partout dans le monde;
- ° a été choisie par l'AIACE (association italienne de domotique) pour occuper un stand à l'exposition de Milan, en mai 1992, en tant qu'une des dix plus importantes présentations au monde dans le domaine des maisons évoluées (c'est l'aspect de la faisabilité économique qui a motivé la décision).

Malgré le succès remporté par le produit initial, de plus amples recherches mettant à contribution de nouveaux produits nous ont menés à tirer les conclusions suivantes sur la conception de notre bus :

1. La conception initiale faisant appel à l'ensemble de câblage Tri-Con a été modifiée afin de pouvoir accepter des câbles plus traditionnels. Nous avons mis davantage l'accent sur la conception du tableau du noeud de transit et sur la réorganisation du câblage en apportant des améliorations au tableau.
2. Nous avons eu recours au système domotique Elan Square D pour effectuer les améliorations nécessaires au tableau du noeud de transit. Des recherches sont en cours en vue de modifier ces tableaux pour les réseaux CEBUS ou LON. Consulter le diagramme pour avoir une représentation graphique des changements et les annexes pour en savoir plus sur les données techniques. (Remarque : Elan a déjà servi à la première maison de démonstration pour CEBUS en Amérique du Nord appelée «The Bright Home».)
3. Nous allons collaborer avec les représentants du fabricant des produits Tri-Con pour tenter de les améliorer afin qu'il soit plus facile de les adapter aux critères de conception du bus domotique.

En terminant, nous désirons préciser que, compte tenu de la nature de cette industrie, la conception, les techniques d'installation, les équipements ainsi que les méthodes d'installation qui font l'objet de ce rapport ne sont fournis qu'à titre d'information. Le fait de suivre les directives mentionnées ne peut garantir la compatibilité avec toutes les technologies futures. Cette mise en garde est justifiée par le fait que nous avons délibérément écarté le recours aux fibres optiques en raison surtout des coûts inhérents à cette technologie.