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[54] **ENERGY MANAGEMENT AND BUILDING AUTOMATION SYSTEM**

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307/126

[58] **Field of Search** 364/492, 493,
364/464.04, 132, 138, 139; 307/38, 39,
41, 115, 116, 126, 132 E

[56] **References Cited**

U.S. PATENT DOCUMENTS

1,547,242	7/1925	Strieby .	
4,075,699	2/1978	Schneider et al.	364/492
4,291,375	9/1981	Wolf	364/483
4,324,987	4/1982	Sullivan, II et al.	307/35
4,336,462	6/1982	Hedges et al.	307/35
4,466,074	8/1984	Jindrick et al.	364/145
4,475,193	10/1984	Brown	379/66
4,503,288	3/1985	Kessler	379/67
4,511,979	4/1985	Amiranle	364/481
4,513,189	4/1985	Ueda et al.	219/714

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

0534839A1	3/1993	European Pat. Off. .
2645968	10/1990	France .
2660511	10/1991	France .
WO93/08653	4/1993	WIPO .
WO94/00824	1/1994	WIPO .
WO94/03989	2/1994	WIPO .
WO94/09572	4/1994	WIPO .

OTHER PUBLICATIONS

"Boosting Your Home's IQ; Manufacturers agree on standards for creating the smart house", Technology, p. 70 (not dated).

Schrock, Clifford B., "Conservation and safety for the 90's using cable TV networks", Cable Bus Systems Corp. (no ref or date).

(List continued on next page.)

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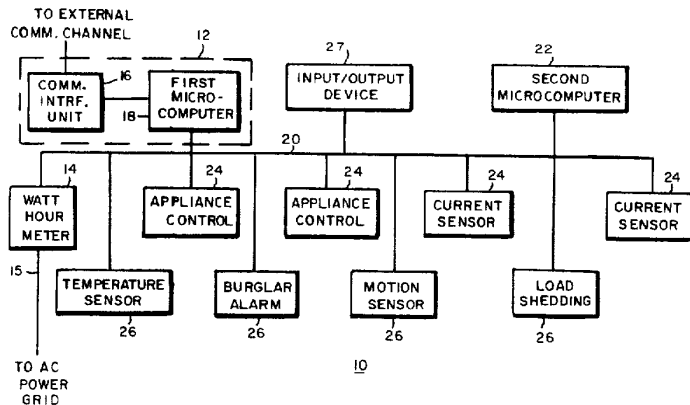
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[57] **ABSTRACT**

An energy management and building automation system including a local area network or home automation data bus such as the CEBus. Each load is connected to the bus via a control module which may contain a circuit breaker to disconnect the load from the mains upon command or upon occurrence of a power outage. Current monitoring control modules measure load current and power monitor modules monitor power consumed by selected loads, both modules transmitting bus messages indicating load status and status changes. A first microcomputer preferably is external to the customer premises, adjacent the electric utility power meter. A second microcomputer preferably is inside the customer premises. The two microcomputers communicate with each other and with the various modules via the network/data bus. The first microcomputer communicates with the utility company via any appropriate communications link. The second microcomputer serves, in part, as an input/output terminal for the system, allowing the customer to set parameters and query the system as to power usage, displaying reports requested by the customer and messages transmitted by the utility company and by either microcomputer. The first microcomputer acts as a master controller and/or network server, communicating with the world outside the premises, as a communications gateway between voice, video and data services, and being the primary data collector and operator of load control modules; the second microcomputer provides certain backup functions. The utility company can access selected utilization data and control at least some loads via messages to the first microcomputer.

29 Claims, 43 Drawing Sheets



U.S. PATENT DOCUMENTS

4,514,594	4/1985	Brown et al.	340/310.01
4,520,576	6/1985	Vander Molen	33/438
4,521,645	6/1985	Carroll	379/42
4,523,307	6/1985	Brown et al.	370/30
4,633,775	5/1987	Olek	100/297
4,665,544	5/1987	Honda et al.	43/82
4,728,949	3/1988	Platte et al.	340/825.37
4,771,185	9/1988	Feron et al.	364/492
4,772,870	9/1988	Reyes	340/310.02
4,819,180	4/1989	Hedman et al.	340/501
4,847,554	7/1989	Goodwin	324/127
4,847,781	7/1989	Brown, III et al.	364/492
4,847,782	7/1989	Brown, Jr. et al.	340/310.01
4,855,922	8/1989	Huddleston et al.	364/493
4,888,495	12/1989	Feron et al.	307/39
4,899,129	2/1990	MacFadyen et al.	340/310.01
4,899,217	2/1990	MacFadyen et al.	348/8
4,977,515	12/1990	Rudden et al.	364/492
4,987,513	1/1991	Shelley	361/92
5,033,112	7/1991	Bowling et al.	359/154
5,045,823	9/1991	Nichols, III	333/132
5,086,385	2/1992	Launey et al.	364/188
5,090,024	2/1992	Vander Mey et al.	375/204
5,101,191	3/1992	MacFadyen et al.	340/310.01
5,109,222	4/1992	Welty	340/825.72
5,126,934	6/1992	MacFadyen	364/140
5,134,356	7/1992	El-Sharkawi et al.	323/211
5,168,170	12/1992	Hartig	307/35
5,196,982	3/1993	Landsberg et al.	361/93
5,218,552	6/1993	Stirk et al.	364/492
5,263,046	11/1993	Vander Mey	375/204
5,278,862	1/1994	Vander Mey	375/200
5,315,499	5/1994	Bilas et al.	364/140
5,323,307	6/1994	Wolf et al.	364/140
5,347,167	9/1994	Singh	307/125
5,436,510	7/1995	Gilbert	307/38
5,469,365	11/1995	Diekema et al.	364/483

OTHER PUBLICATIONS

- Dawson, Fred, "Energy saver can support voice and data", *Multichannel News*, Oct. 21, 1991.
- "Schlumberger launches new venture for building automation systems in Europe using Echelon Technology", *Bus. Wire*, Jul. 13, 1992.
- Saladyga, John S., "New home automation systems integrate security, energy and entertainment", *Newsday, Inc.*, Oct. 15, 1992.
- Rupinski, Patrick, "New device automatically alerts company of power interruption", (no ref or date).
- Nigghi, Michael R., "PowerView: Two-Way Customer Communications" (no ref or date).
- "Demonstrating smarts; bright home: a demonstration home that utilizes consumer electronics . . ." *Popular Science*, Jul. 1991.
- "Scientific—Allianta, Bell Atlantic To Offer Cost-Effective Information", *PR Newswire*, Sep. 23, 1991 (Mary Nagel-hout).
- "Entergy moves into fiber optics to control residential consumption", *Energy Report*, Dec. 14, 1992, vol. 20, No. 49 (sr abst).
- "Commonwealth Edison installs Metricom's communication network" *Business Wire*, Mar. 4, 1993.
- Sanders, Michele, "Interfacing with the home of the future", *Information Access*, Apr. 1993.
- "PGW to begin automatic meter reader installations in 500,000 homes in June", *PR Newswire Assoc.*, Apr. 2, 1993.
- Jones, David A., "Smart Money? Home automation systems", *Builder* Jun. 1993, pp. 162-166.
- Millar, Heather, "Smart houses: getting switched on", *Business Week*, Jun. 28, 1993.
- "Is DSM having an impact on electric-utility credit ratings?", *Electrical World*, Aug. 1993.
- "Entergy Enterprises' CC2000 test joined by Sprint, Honeywell . . ." *PR Newswire Assoc.*, Aug. 26, 1993.
- Kaplan, Daniel, "DSM Monitoring a key issue for utility industry E-source", *The Energy Daily*, Oct. 5, 1993.
- Jones, David A., "Cutting edge; three houses that break the rules and break new ground . . ." *Builder Info Access*, Nov. 1993.
- Piepmeyer, James M. et al, "The tools of competition: differentiation, segmentation . . ." *The Electricity Journal*, Nov. 1993.
- Colman, Andrew et al, "Competitive edge—Power View: a DSM-focused technology", *Fortnightly*, Nov. 1, 1993.
- Vizard, Frank, "Building the information superhighway", *Popular Mechanics*, Jan. 1994.
- "Entergy announces a major development in its residential customer-controlled load manage . . ." *PR Newswire Assoc.*, Jan. 19, 1994.
- McLeister, Dan, "Dramatic changes lie ahead for home automation" *Professional Builder & Remodeler*, Feb. 1994.
- "Cebus (R) power line carrier technologies from Intellon Corp. support home automation application . . ." *PR Newswire*, Mar. 1, 1994.
- "Honeywell, Oracle Corp. unveil joint technology and marketing alliance", *Electric Utility Week's Demand-Side Report*, Mar. 3, 1994.
- Phillips, Tim, "Welcome to the computerized home", *The Guardian*, Mar. 10, 1994.
- "First Pacific Networks, Central and South West Corp. to conduct energy management project in Laredo, TX", *Business Wire*, Mar. 24, 1994.
- "Johnson Controls makes major entry into home energy automation market, . . ." *PR Newswire*, Mar. 28, 1994.
- "Re-engineering electric utility metering and communications", *Transmission & Distribution*, Apr. 1994.
- Cain, Charles J., "Metering gets real", *Fortnightly*, Apr. 1, 1994, pp. 39-40.
- "Itron signs \$27 million contract with Baltimore Gas and Electric", *PR Newswire*, Apr. 4, 1994.
- "Leading companies demonstrate home automation based on Echelon's technology", *Business Wire*, Apr. 14, 1994.
- Salpukas, Agis, "Big hopes put on electric wires", *The New York Times*, Jul. 6, 1994.
- Karve, Anita, "Brainy Buildings", *LAN Magazine*, Aug. 1994.
- "LonWorks—the choice in home automation", *Motorola*, Mar. 1994.
- "Home automation: what's in it for utilities?", *EPRI*, Apr. 1990.
- "50 Successful DSM Programs", *The Results Center*, lists.
- "Variable electric rates", *Transtext*.
- "Bell of Pennsylvania's automatic meter reading could mean greater security and privacy for customers", *PR Newswire*, Feb. 28, 1990.
- "NetComm matures as advanced communication and metering system", *Research Newsletter*, 4th quarter 1990.
- Teletimer Energy Savings Service: "Low-cost—high value building automation".
- "PLC features & specifications", *Regency Electronics, Inc.*
- "Using the line sharing switch in power utility load study applications", *Telton Telesolutions*, 1993.
- Home Automation Laboratories, *Fall 1994 Catalog*.
- "S87C752 CMOS single-chip 8-bit microcontroller", *Singetics*.

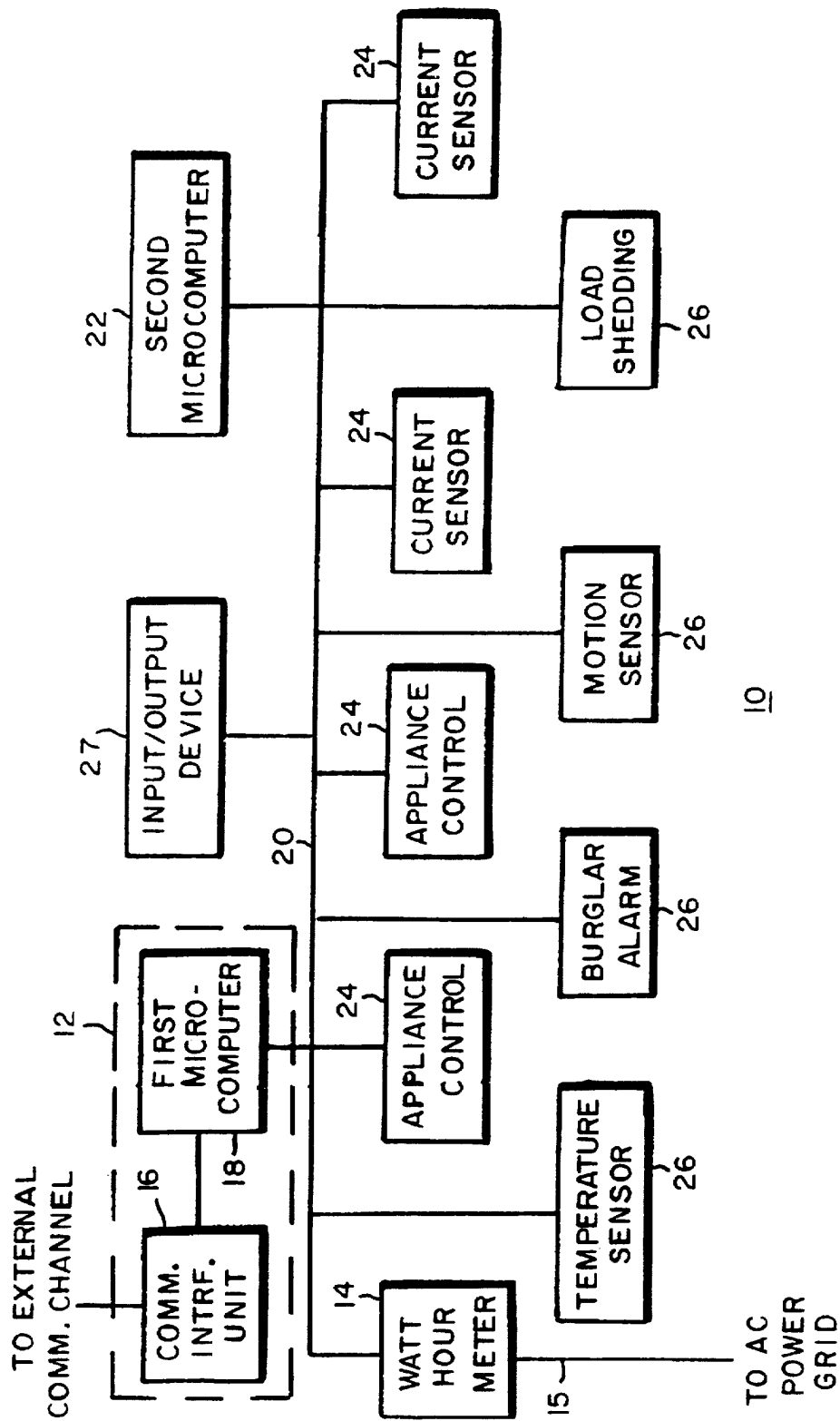
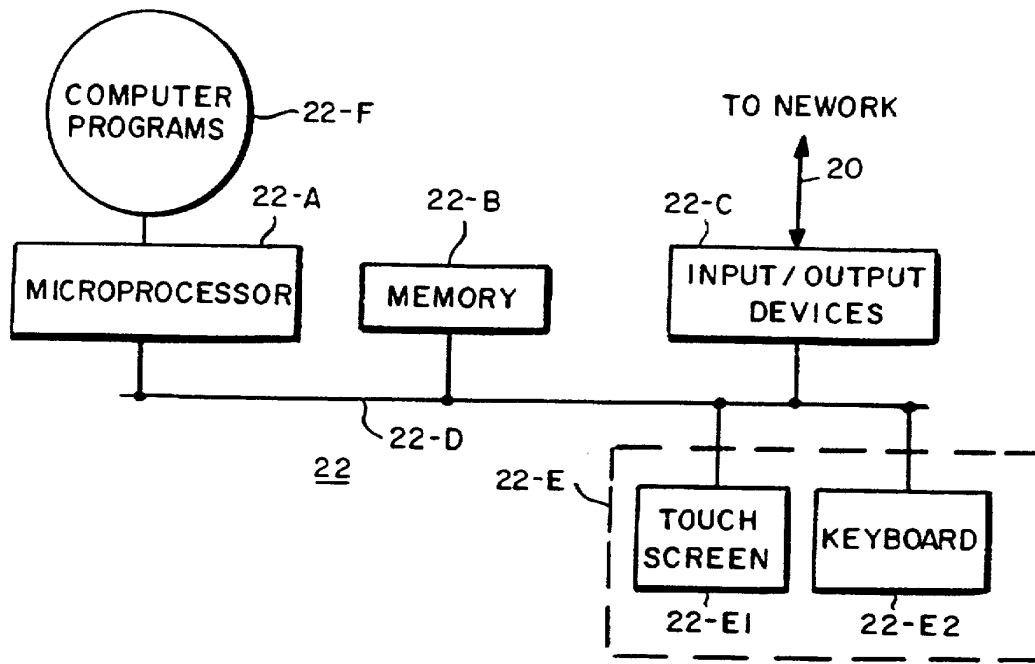
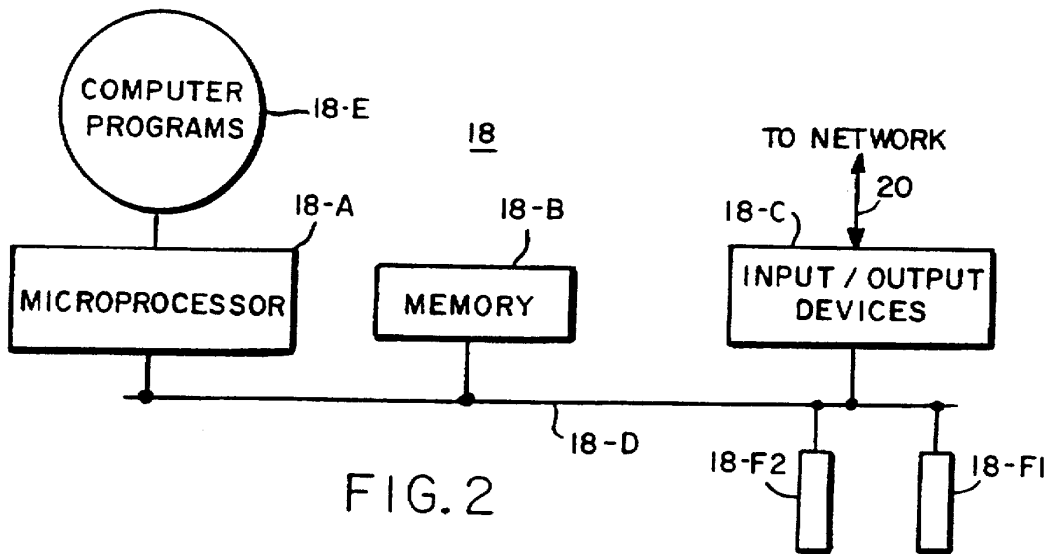


FIG. 1



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