

AO 120 (Rev. 08/10)

|                                                                                                                                                         |                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>TO:</b><br><b>Mail Stop 8</b><br><b>Director of the U.S. Patent and Trademark Office</b><br><b>P.O. Box 1450</b><br><b>Alexandria, VA 22313-1450</b> | <b>REPORT ON THE</b><br><b>FILING OR DETERMINATION OF AN</b><br><b>ACTION REGARDING A PATENT OR</b><br><b>TRADEMARK</b> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court WESTERN DISTRICT OF TEXAS on the following

☐ Trademarks or ☒ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.);

|                                     |                                |                                                  |
|-------------------------------------|--------------------------------|--------------------------------------------------|
| DOCKET NO.<br>6:22-cv-131           | DATE FILED<br>2/6/2022         | U.S. DISTRICT COURT<br>WESTERN DISTRICT OF TEXAS |
| PLAINTIFF<br>ROSEN TECHNOLOGIES LLC |                                | DEFENDANT<br>RESIDEO TECHNOLOGIES, INC.          |
| PATENT OR<br>TRADEMARK NO.          | DATE OF PATENT<br>OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK                    |
| 1 6,581,846                         | 6/24/2003                      | ROSEN TECHNOLOGIES LLC                           |
| 2 6,619,555                         | 9/16/2003                      | ROSEN TECHNOLOGIES LLC                           |
| 3 6,789,739                         | 9/14/2004                      | ROSEN TECHNOLOGIES LLC                           |
| 4 7,156,318                         | 1/7/2007                       | ROSEN TECHNOLOGIES LLC                           |
| 5 7,185,825                         | 3/6/2007                       | ROSEN TECHNOLOGIES LLC                           |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

|                            |                                                                                                                                                               |                               |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| DATE INCLUDED              | INCLUDED BY<br><input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading |                               |
| PATENT OR<br>TRADEMARK NO. | DATE OF PATENT<br>OR TRADEMARK                                                                                                                                | HOLDER OF PATENT OR TRADEMARK |
| 1                          |                                                                                                                                                               |                               |
| 2                          |                                                                                                                                                               |                               |
| 3                          |                                                                                                                                                               |                               |
| 4                          |                                                                                                                                                               |                               |
| 5                          |                                                                                                                                                               |                               |

In the above—entitled case, the following decision has been rendered or judgement issued:

|                    |
|--------------------|
| DECISION/JUDGEMENT |
|--------------------|

|       |                   |      |
|-------|-------------------|------|
| CLERK | (BY) DEPUTY CLERK | DATE |
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Copy 1—Upon initiation of action, mail this copy to Director    Copy 3—Upon termination of action, mail this copy to Director  
Copy 2—Upon filing document adding patent(s), mail this copy to Director    Copy 4—Case file copy

AO 120 (Rev. 08/10)

|                                                                                                                                                         |                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>TO:</b><br><b>Mail Stop 8</b><br><b>Director of the U.S. Patent and Trademark Office</b><br><b>P.O. Box 1450</b><br><b>Alexandria, VA 22313-1450</b> | <b>REPORT ON THE</b><br><b>FILING OR DETERMINATION OF AN</b><br><b>ACTION REGARDING A PATENT OR</b><br><b>TRADEMARK</b> |
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| PLAINTIFF<br>ROSEN TECHNOLOGIES LLC |                                | DEFENDANT<br>RESIDEO TECHNOLOGIES, INC.          |
| PATENT OR<br>TRADEMARK NO.          | DATE OF PATENT<br>OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK                    |
| 1 7,232,075                         | 6/19/2007                      | ROSEN TECHNOLOGIES LLC                           |
| 2 RE40,437                          | 7/15/2008                      | ROSEN TECHNOLOGIES LLC                           |
| 3                                   |                                |                                                  |
| 4                                   |                                |                                                  |
| 5                                   |                                |                                                  |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

|                            |                                                                                                                                                               |                               |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| DATE INCLUDED              | INCLUDED BY<br><input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading |                               |
| PATENT OR<br>TRADEMARK NO. | DATE OF PATENT<br>OR TRADEMARK                                                                                                                                | HOLDER OF PATENT OR TRADEMARK |
| 1                          |                                                                                                                                                               |                               |
| 2                          |                                                                                                                                                               |                               |
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| 5                          |                                                                                                                                                               |                               |

In the above—entitled case, the following decision has been rendered or judgement issued:

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|--------------------|
| DECISION/JUDGEMENT |
|--------------------|

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|-------|-------------------|------|
| CLERK | (BY) DEPUTY CLERK | DATE |
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 Copy 2—Upon filing document adding patent(s), mail this copy to Director    Copy 4—Case file copy

## PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1  
 Stylesheet Version v1.2

EPAS ID: PAT7129032

|                                   |                        |                       |
|-----------------------------------|------------------------|-----------------------|
| <b>SUBMISSION TYPE:</b>           | NEW ASSIGNMENT         |                       |
| <b>NATURE OF CONVEYANCE:</b>      | ASSIGNMENT             |                       |
| <b>CONVEYING PARTY DATA</b>       |                        |                       |
| <b>Name</b>                       |                        | <b>Execution Date</b> |
| IAED TECHNOLOGIES INC             |                        | 12/03/2021            |
| <b>RECEIVING PARTY DATA</b>       |                        |                       |
| <b>Name:</b>                      | ROSEN TECHNOLOGIES LLC |                       |
| <b>Street Address:</b>            | 17330 PRESTON RD       |                       |
| <b>Internal Address:</b>          | ST 200D                |                       |
| <b>City:</b>                      | DALLAS                 |                       |
| <b>State/Country:</b>             | TEXAS                  |                       |
| <b>Postal Code:</b>               | 75252                  |                       |
| <b>PROPERTY NUMBERS Total: 18</b> |                        |                       |
| <b>Property Type</b>              | <b>Number</b>          |                       |
| Patent Number:                    | 7232075                |                       |
| Patent Number:                    | 7152806                |                       |
| Patent Number:                    | 7156318                |                       |
| Patent Number:                    | 7185825                |                       |
| Patent Number:                    | 7145110                |                       |
| Patent Number:                    | 7058477                |                       |
| Patent Number:                    | 7028912                |                       |
| Patent Number:                    | 7050026                |                       |
| Patent Number:                    | 6902117                |                       |
| Patent Number:                    | 6789739                |                       |
| Patent Number:                    | 6786421                |                       |
| Patent Number:                    | 6619555                |                       |
| Patent Number:                    | 6578770                |                       |
| Patent Number:                    | 6581846                |                       |
| Patent Number:                    | 7841542                |                       |
| Patent Number:                    | 7838803                |                       |
| Application Number:               | 13953135               |                       |
| Application Number:               | 14313507               |                       |

**CORRESPONDENCE DATA****Fax Number:**

*Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.*

**Email:** JASON@IPVAL.COM  
**Correspondent Name:** JASON BOURGEOIS  
**Address Line 1:** 4940 BROADWAY STREET  
**Address Line 2:** ST130  
**Address Line 4:** SAN ANTONIO, TEXAS 78209

|                           |                                                            |
|---------------------------|------------------------------------------------------------|
| <b>NAME OF SUBMITTER:</b> | JASON BOURGEOIS                                            |
| <b>SIGNATURE:</b>         | /JASON BOURGEOIS/                                          |
| <b>DATE SIGNED:</b>       | 01/19/2022                                                 |
|                           | This document serves as an Oath/Declaration (37 CFR 1.63). |

**Total Attachments: 3**

source=IAED and Rosen Tech Patent Assignment#page1.tif  
source=IAED and Rosen Tech Patent Assignment#page2.tif  
source=IAED and Rosen Tech Patent Assignment#page3.tif

## PATENT ASSIGNMENT AGREEMENT

THIS PATENT ASSIGNMENT AGREEMENT (the "Agreement"), is made and entered into this 3<sup>rd</sup> day of December, 2021 (the "Effective Date"), is by and between IAED Technologies Inc., a Canadian Company with a principal place of business at 695 Chenin Avila Unit 7 Suite 259, Piedmont, Quebec, J0R1T0 Canada ("Assignor") and Rosen Technologies, LLC, a Texas company organized under the laws of Texas, ("Assignee"). Assignor and Assignee are also referred to in this Agreement each as a "Party" and collectively as the "Parties."

WHEREAS, Assignor is the sole owner of all rights, title and interest in and to the inventions (the "Inventions") as described and claimed in the United States and foreign patents and patent application as listed on Schedule A (United States patent properties) and Schedule B (foreign patent properties) hereto (collectively the "Patents");

NOW, THEREFORE, in consideration of the mutual covenants and agreements of the Parties and pursuant to the Purchase Agreement, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, it is hereby agreed as follows:

### I. ASSIGNMENT

1. Assignor hereby sells, transfers, assigns and sets over to Assignee all rights, title and interest (for all countries) in and to the Inventions and the Patents, and all the rights and privileges under any letters patent that may be granted under any continuations, divisions, reissues, reexaminations, renewals and extensions therefor and thereon and all continuations, divisions, reissues, reexaminations, renewals and extensions thereof; and all applications for industrial property protection, including without limitation, all applications for patents, utility models, copyright, and designs which may hereafter be filed for said Inventions and Patents in any country or countries, together with the right to file such applications and the right to claim for the same the priority rights derived from the Inventions and the Patents under the patent laws of the United States, the International Convention for the Protection of Industrial Property, or any other international agreement or the domestic laws of the country in which any such application is filed, as may be applicable; and all applications for industrial property protection, including, without limitation, all applications for patents, utility models, copyrights and designs which may hereafter be filed for said Inventions or Patents in any country or countries, together with the right to file such applications; and all forms of industrial property protection, including, without limitation, patents, utility models, inventors' certificates, copyrights and designs which may be granted for said Invention and/or Patent in any country or countries and all extensions, renewals and reissues thereof.
2. The rights, title and interest transferred above are subject to Assignor having previously granted a non-exclusive, fully paid up, royalty-free license to the Patents to Verdant Environmental Technologies Inc. dated August 31, 2016 (Verdant License) presently held through acquisition by Emerson Electric Co. For the avoidance of doubt, Emerson Electric Co. (including its Subsidiaries) or any subsequent acquirer of this pre-existing license. Further, including the right to expand the license in the future to products branded under other trademarks owned by the holding licensee.
3. Assignor hereby authorizes and requests the Commissioner of Patents and Trademarks of the

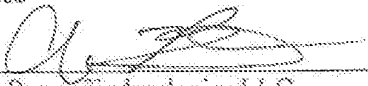
United States and any official of any country or countries foreign to the United States, whose duty is to issue patents or other evidence or forms of industrial property on applications as aforesaid, to issue the same to Assignee, its successors, assigns and legal representatives, or to such nominees as it may designate.

4. Assignor agrees that, whenever reasonably requested by Assignee, Assignor will execute all papers, take all rightful oaths, and do all acts which may be reasonably necessary for securing and maintaining patents for the Inventions in any country and for vesting title thereto in Assignee, its successors, assigns and legal representatives or nominees.
5. Assignor authorizes and empowers Assignee, its successors, assigns and legal representatives or nominees, to invoke and claim for any application for patent or other form of protection for the Inventions, the benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it, or any other international agreement or the domestic laws of the country in which any such application is filed, as may be applicable, and to invoke and claim such right of priority without further written or oral authorization from Assignor.
6. Assignor hereby consents that a copy of this Agreement shall be deemed a full legal and formal equivalent of any assignment, consent to file or like document that may be required in any country for any purpose and more particularly in proof of the right of Assignee or nominee to claim the aforesaid benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it.
7. All of the rights, title and interest in and to the Inventions and the Patents sold, transferred, assigned and set over to Assignee hereunder include all income, royalties, damages and payments now or hereafter due or payable with respect thereto, and all causes of action (whether in law or equity) and the right to sue, counterclaim, and recover for the past, present and future infringement of the rights assigned or to be assigned hereunder.

Assignor

  
By: IAED Technologies, Inc.  
Name: Howard Rosen  
Title: Managing Member

Assignee

  
By: Rosen Technologies LLC  
Name: Adam Baumli  
Title: Managing Member

**SCHEDULE A**  
**UNITED STATES PATENTS AND PATENT APPLICATIONS**

**U.S. Patent Application Publications**

| Publication Number | Application Number | Publication Date | Application Date | Issue Date |
|--------------------|--------------------|------------------|------------------|------------|
| US20150028114A1    | 13/953,135         | 1/29/2015        | 7/29/2013        | Pending    |
| US20150369508A1    | 14/313,507         | 12/24/2015       | 6/24/2014        | Pending    |

**U.S. Patent Publications**

| Patent Number | Application Number | Publication Date | Application Date | Issue Date |
|---------------|--------------------|------------------|------------------|------------|
| US7232075B1   | 11/039,180         | 6/19/2007        | 1/19/2005        | 6/19/2007  |
| US7152806B1   | 10/654,230         | 12/26/2006       | 9/3/2003         | 12/26/2006 |
| US7156318B1   | 10/654,235         | 1/2/2007         | 9/3/2003         | 1/2/2007   |
| US7185825B1   | 10/875,579         | 3/6/2007         | 6/24/2004        | 3/6/2007   |
| US7145110B1   | 11/254,078         | 12/5/2006        | 10/19/2005       | 12/5/2006  |
| US7058477B1   | 10/995,574         | 6/6/2006         | 11/23/2004       | 6/6/2006   |
| US7028912B1   | 10/878,825         | 4/18/2006        | 6/28/2004        | 4/18/2006  |
| US7050026B1   | 10/440,474         | 5/23/2006        | 5/15/2003        | 5/23/2006  |
| US6902117B1   | 10/420,660         | 6/7/2005         | 4/21/2003        | 6/7/2005   |
| US6789739B2   | 10/287,677         | 9/14/2004        | 11/4/2002        | 9/14/2004  |
| US6786421B2   | 10/654,236         | 9/7/2004         | 9/3/2003         | 9/7/2004   |
| US6619555B2   | 10/075,866         | 9/16/2003        | 2/13/2002        | 9/16/2003  |
| US6578770B1   | 10/119,180         | 6/17/2003        | 4/9/2002         | 6/17/2003  |
| US6581846B1   | 10/091,767         | 6/24/2003        | 3/6/2002         | 6/24/2003  |
| US7841542B1   | 11/557,492         | 11/30/2010       | 11/7/2006        | 11/30/2010 |
| US7836803B1   | 11/852,036         | 11/23/2010       | 9/7/2007         | 11/23/2010 |



# UNITED STATES PATENT AND TRADEMARK OFFICE

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[www.uspto.gov](http://www.uspto.gov)

| APPLICATION NO. | ISSUE DATE | PATENT NO. | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|------------|------------|---------------------|------------------|
| 10/875,579      | 03/06/2007 | 7185825    | 0402.2A4            | 9842             |

51413 7590 02/14/2007  
MARC E. HANKIN, ESQ.  
11414 THURSTON CIRCLE  
LOS ANGELES, CA 90049

## ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

### **Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)** (application filed on or after May 29, 2000)

The Patent Term Adjustment is 241 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Howard Rosen, Hampstead, CANADA;



Type a plus sign (+) inside this box.



Approved for use through 10/31/2002. Call 888-433-1831  
U.S. Patent and Trademark Office U.S. DEPARTMENT OF COMMERCE  
If you are a foreign applicant, please indicate your country of origin in the space provided below the title.

Substitute for form 1442A/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet 1 of 1

Complete if Known

Application Number 10/873,579  
Filing Date  
First Named Inventor Rosen  
Group Art Unit  
Examiner Name  
Attorney Doctel Number 0208.2cA4

4w  
1-25-07

## U.S. PATENT DOCUMENTS

| Examiner<br>Initials | Cite<br>No. | U.S. Patent Document |                         | Name of Patentee or Applicant<br>of Cited Document | Date of Publication of<br>Cited Document |      | Page, Column, Line,<br>Where Relevant<br>Paragraph or Subpart<br>Figure or Table |
|----------------------|-------------|----------------------|-------------------------|----------------------------------------------------|------------------------------------------|------|----------------------------------------------------------------------------------|
|                      |             | Number               | Kind Code<br>(if known) |                                                    | MM-DD-YYYY                               |      |                                                                                  |
| 4w                   |             | 4,224,615            |                         | Penz                                               | 9                                        | 1980 |                                                                                  |
| 4w                   |             | 5,086,385            |                         | Launey et al.                                      | 2                                        | 1992 |                                                                                  |
| 4w                   |             | 5,170,935            |                         | Erderspiel et al.                                  | 12                                       | 1992 |                                                                                  |
| 4w                   |             | 5,818,428            |                         | Eisenbrandt et al.                                 | 10                                       | 1998 |                                                                                  |
| 4w                   |             | 6,059,195            |                         | Adams et al.                                       | 5                                        | 2000 |                                                                                  |
| 4w                   |             | 6,182,282            |                         | Smith et al.                                       | 2                                        | 2001 |                                                                                  |
| 4w                   |             | 6,285,912            |                         | Ellison et al.                                     | 9                                        | 2001 |                                                                                  |
| 4w                   |             | 6,330,806            |                         | Beaverson et al.                                   | 12                                       | 2001 |                                                                                  |
| 4w                   |             | 6,344,861            |                         | Naughton et al.                                    | 2                                        | 2002 |                                                                                  |
| 4w                   |             | 6,478,233            |                         | Shah                                               | 11                                       | 2002 |                                                                                  |
| 4w                   |             | 6,595,430            |                         | Shah                                               | 7                                        | 2003 |                                                                                  |
| 4w                   |             | 6,621,507            |                         | Shah                                               | 9                                        | 2003 |                                                                                  |

## FOREIGN PATENT DOCUMENTS

| Examiner<br>Initials | Cite<br>No. | Foreign Patent Document |           | Name of Patentee or<br>Applicant of Cited Document | Date of Publication of<br>Cited Document |  | Page, Column, Line,<br>Where Relevant<br>Paragraph or Subpart<br>Figure or Table |
|----------------------|-------------|-------------------------|-----------|----------------------------------------------------|------------------------------------------|--|----------------------------------------------------------------------------------|
|                      |             | Office                  | Number    |                                                    | MM-DD-YYYY                               |  |                                                                                  |
| 4w                   |             | DE                      | 3334117.8 |                                                    | 4/1985                                   |  |                                                                                  |
| 4w                   |             | EP                      | 0965994   |                                                    | 3/2000                                   |  |                                                                                  |
| 4w                   |             | WO                      | 97/11448  |                                                    | 3/1997                                   |  |                                                                                  |
| 4w                   |             | WO                      | 97/38392  |                                                    | 10/1997                                  |  |                                                                                  |

Examiner  
Signature

*[Signature]*

Date

Considered

1/5/07

\*EXAMINER: Initial if reference considered, whether or not citation is in accordance with MPEP 802. Do not check citation if not in accordance and not considered. Include copy of this form with next communication to applicant.

1 Unique citation designation number. 2 See attached kinds of U.S. Patent Documents. 3 Enter Office that issued the document, by the two-letter code (WIPO Standard ST. 2). 4 For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. 5 Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. 6 Applicant to place a check mark here if English language translation is attached.

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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/875,579      | 06/24/2004  | Howard Rosen         | 0402.2A4            | 9842             |

|                                                                        |      |            |
|------------------------------------------------------------------------|------|------------|
| 51413                                                                  | 7590 | 01/09/2007 |
| MARC E. HANKIN, ESQ.<br>11414 THURSTON CIRCLE<br>LOS ANGELES, CA 90049 |      |            |

| EXAMINER       |
|----------------|
| NORMAN, MARC E |

| ART UNIT | PAPER NUMBER |
|----------|--------------|
| 3744     |              |

| MAIL DATE  | DELIVERY MODE |
|------------|---------------|
| 01/09/2007 | PAPER         |

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|---------------------------------|-------------|---------------------------------------------------|---------------------|
| APPLICATION NO./<br>CONTROL NO. | FILING DATE | FIRST NAMED INVENTOR /<br>PATENT IN REEXAMINATION | ATTORNEY DOCKET NO. |
|---------------------------------|-------------|---------------------------------------------------|---------------------|

10/875,579

6/24/04

ROSEN

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NORMAN

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| ART UNIT | PAPER |
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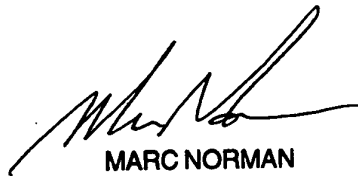
20070105

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

Please find attached an initialed copy of the IDS filed 2/7/05.

  
MARC NORMAN  
PRIMARY EXAMINER

|                                                                                                                                               |   |    |   |                          |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---|----|---|--------------------------|-----------|
| Substitute for form 1449A/PTO<br><br><b>INFORMATION DISCLOSURE<br/>STATEMENT BY APPLICANT</b><br><br><i>(use as many sheets as necessary)</i> |   |    |   | <b>Complete If Known</b> |           |
|                                                                                                                                               |   |    |   | Application Number       |           |
|                                                                                                                                               |   |    |   | Filing Date              |           |
|                                                                                                                                               |   |    |   | First Named Inventor     | Rosen     |
|                                                                                                                                               |   |    |   | Group Art Unit           |           |
|                                                                                                                                               |   |    |   | Examiner Name            |           |
| Sheet                                                                                                                                         | 1 | of | 1 | Attorney Docket Number   | 0208.2cA4 |

[illegible][illegible]

|                       |                                                                                     |                    |        |
|-----------------------|-------------------------------------------------------------------------------------|--------------------|--------|
| Examiner<br>Signature |  | Date<br>Considered | 1/5/07 |
|-----------------------|-------------------------------------------------------------------------------------|--------------------|--------|

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> Unique citation designation number. <sup>2</sup> See attached Kinds of U.S. Patent Documents. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup> Applicant is to place a check mark here if English language Translation is attached.

**Burden Hour Statement:** This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U. S. Patent and Trademark Office, Washington, DC 20231. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.**

Substitute for form 1449B/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet

of

**Complete if Known**

Application Number

**Filing Date**

**First Named Inventor**

### Group Art Unit

**Examiner Name**

Attorney Docket Number

## OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS

| Examiner<br>Initials* | Cite<br>No.† | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | T² |
|-----------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| mm                    |              | <p>1. ADI, "Leopard User Manual," 93 pages, 2001.</p> <p>2. Business Wire, "MicroTouch Specialty Products Group to Capitalize on Growing Market for Low-Cost Digital Matrix Touchscreens," p1174 (2 pages), January 6, 1999.</p> <p>3. DeKoven et al., "Designing Collaboration in Consumer Products," 2 pages, 2001.</p> <p>Freudenthal et al., "Communicating extensive smart home functionality to users of all ages: the design of a mixed-initiative multimodal thermostat-interface," pp. 34-39, March 12-13, 2001.</p> <p>4. Honeywell News Release, "Honeywell's New Sysnet Facilities Integration System For Boiler Plant and Combustion Safety Processes," 4 pages, December 15, 1995. ✓</p> <p>5. Honeywell, "W7006A Home Controller Gateway User Guide," 31 pages, July 2001.</p> <p>6. "High-tech options take hold in new homes - 200-08-28 - Dallas Business Journal," <a href="http://bizjournals.com/dallas/stories/2000/08/28/focus4">http://bizjournals.com/dallas/stories/2000/08/28/focus4</a>, 3 pages, dated August 28, 2000, printed August 19, 2004. ✓</p> <p>7. "Product Review - Philips Pronto Remote Control," <a href="http://hometheaterhifi.com/volume/6/2/philipsprontoremotecontrol.html">http://hometheaterhifi.com/volume/6/2/philipsprontoremotecontrol.html</a>, 5 pages, dated May 1999, printed August 20, 2004.</p> <p>8. <a href="http://www.cc.gatech.edu/computing/classes/cs6751/94/fall/2roupc/climate-2/node.1.html">http://www.cc.gatech.edu/computing/classes/cs6751/94/fall/2roupc/climate-2/node.1.html</a>, "Contents," 53 pages, printed September 20, 2004.</p> <p>9. "HAI Company Background," <a href="http://www.homeauto.com/AboutHAI/abouthai_main.htm">http://www.homeauto.com/AboutHAI/abouthai_main.htm</a>, 2 pages, printed August 19, 2004.</p> <p>10. Cardio Manual, available at <a href="http://www.secant.ca/En/Documentation/Cardio26-Manual.pdf">http://www.secant.ca/En/Documentation/Cardio26-Manual.pdf</a>, Cardio Home Automation Inc., 55 pages, printed September 28, 2004. ✓</p> <p>11. "RC X10 Automation Forum: Control your Heating and Cooling System with Pronto(1/1)," <a href="http://www.remotecentral.com/cgi-bin/lmboardlrc-x-1/0/thread.c-i?">http://www.remotecentral.com/cgi-bin/lmboardlrc-x-1/0/thread.c-i?</a> 12, 2 pages, dated April 23, 1999, printed August 20, 2004.</p> |    |

**Examiner  
Signature**

Date Considered

1/5/07

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## PART B - FEE(S) TRANSMITTAL

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**P.O. Box 1450**  
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CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

51413 7590 11/21/2006

MARC E. HANKIN, ESQ.  
 11414 THURSTON CIRCLE  
 LOS ANGELES, CA 90049

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

## Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

|                   |                    |
|-------------------|--------------------|
| Grace Pak         | (Depositor's name) |
|                   | (Signature)        |
| November 29, 2006 | (Date)             |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/875,579      | 06/24/2004  | Howard Rosen         | 0402.2A4            | 9842             |

TITLE OF INVENTION: PROGRAMMABLE THERMOSTAT EMPLOYING A FAIL SAFE REAL TIME CLOCK

| APPLN. TYPE    | SMALL ENTITY | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE   |
|----------------|--------------|---------------|---------------------|----------------------|------------------|------------|
| nonprovisional | YES          | \$700         | \$0                 | \$0                  | \$700            | 02/21/2007 |

| EXAMINER       | ART UNIT | CLASS-SUBCLASS |
|----------------|----------|----------------|
| NORMAN, MARC E | 3744     | 236-04600C     |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Marc E. Hankin  
 2 Hankin Patent Law  
 3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies

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- ☐ A check is enclosed.
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- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
- ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature

Date

November 29, 2006

Typed or printed name

Marc E. Hankin

Registration No.

38,908

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| Electronic Patent Application Fee Transmittal |          |                                                               |        |                      |
|-----------------------------------------------|----------|---------------------------------------------------------------|--------|----------------------|
| Application Number:                           |          | 10875579                                                      |        |                      |
| Filing Date:                                  |          | 24-Jun-2004                                                   |        |                      |
| Title of Invention:                           |          | PROGRAMMABLE THERMOSTAT EMPLOYING A FAIL SAFE REAL TIME CLOCK |        |                      |
| First Named Inventor/Applicant Name:          |          | Howard Rosen                                                  |        |                      |
| Filer:                                        |          | Marc E. Hankin/Grace Pak                                      |        |                      |
| Attorney Docket Number:                       |          | 0402.2A4                                                      |        |                      |
| Filed as Small Entity                         |          |                                                               |        |                      |
| Utility      Filing Fees                      |          |                                                               |        |                      |
| Description                                   | Fee Code | Quantity                                                      | Amount | Sub-Total in USD(\$) |
| Basic Filing:                                 |          |                                                               |        |                      |
| Pages:                                        |          |                                                               |        |                      |
| Claims:                                       |          |                                                               |        |                      |
| Miscellaneous-Filing:                         |          |                                                               |        |                      |
| Petition:                                     |          |                                                               |        |                      |
| Patent-Appeals-and-Interference:              |          |                                                               |        |                      |
| Post-Allowance-and-Post-Issuance:             |          |                                                               |        |                      |
| Utility Appl issue fee                        | 2501     | 1                                                             | 700    | 700                  |
| Extension-of-Time:                            |          |                                                               |        |                      |

| Description              | Fee Code | Quantity | Amount | Sub-Total in USD(\$) |
|--------------------------|----------|----------|--------|----------------------|
| <b>Miscellaneous:</b>    |          |          |        |                      |
| <b>Total in USD (\$)</b> |          |          |        | <b>700</b>           |

## Electronic Acknowledgement Receipt

|                                             |                                                               |
|---------------------------------------------|---------------------------------------------------------------|
| <b>EFS ID:</b>                              | 1342191                                                       |
| <b>Application Number:</b>                  | 10875579                                                      |
| <b>International Application Number:</b>    |                                                               |
| <b>Confirmation Number:</b>                 | 9842                                                          |
| <b>Title of Invention:</b>                  | PROGRAMMABLE THERMOSTAT EMPLOYING A FAIL SAFE REAL TIME CLOCK |
| <b>First Named Inventor/Applicant Name:</b> | Howard Rosen                                                  |
| <b>Customer Number:</b>                     | 51413                                                         |
| <b>Filer:</b>                               | Marc E. Hankin/Grace Pak                                      |
| <b>Filer Authorized By:</b>                 | Marc E. Hankin                                                |
| <b>Attorney Docket Number:</b>              | 0402.2A4                                                      |
| <b>Receipt Date:</b>                        | 29-NOV-2006                                                   |
| <b>Filing Date:</b>                         | 24-JUN-2004                                                   |
| <b>Time Stamp:</b>                          | 20:15:00                                                      |
| <b>Application Type:</b>                    | Utility                                                       |

### Payment information:

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| Payment was successfully received in RAM | \$ 700 |
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### File Listing:

| Document Number | Document Description | File Name | File Size(Bytes) | Multi Part /.zip | Pages (if appl.) |
|-----------------|----------------------|-----------|------------------|------------------|------------------|
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| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Issue Fee Payment Recorded | HRosen-EEROM-IssueFee.pdf | 102565 | no | 1 |
| <b>Warnings:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                            |                           |        |    |   |
| <b>Information:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                            |                           |        |    |   |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Fee Worksheet (PTO-875)    | fee-info.pdf              | 8169   | no | 2 |
| <b>Warnings:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                            |                           |        |    |   |
| <b>Information:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                            |                           |        |    |   |
| <b>Total Files Size (in bytes):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                            |                           | 110734 |    |   |
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## NOTICE OF ALLOWANCE AND FEE(S) DUE

51413 7590 11/21/2006  
MARC E. HANKIN, ESQ.  
11414 THURSTON CIRCLE  
LOS ANGELES, CA 90049

|                |              |
|----------------|--------------|
| EXAMINER       |              |
| NORMAN, MARC E |              |
| ART UNIT       | PAPER NUMBER |
| 3744           |              |

DATE MAILED: 11/21/2006

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/875,579      | 06/24/2004  | Howard Rosen         | 0402.2A4            | 9842             |

TITLE OF INVENTION: PROGRAMMABLE THERMOSTAT EMPLOYING A FAIL SAFE REAL TIME CLOCK

| APPLN. TYPE    | SMALL ENTITY | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE   |
|----------------|--------------|---------------|---------------------|----------------------|------------------|------------|
| nonprovisional | YES          | \$700         | \$0                 | \$0                  | \$700            | 02/21/2007 |

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

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If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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|                    |
|--------------------|
| (Depositor's name) |
| (Signature)        |
| (Date)             |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/875,579      | 06/24/2004  | Howard Rosen         | 0402.2A4            | 9842             |

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|----------------|--------------|---------------|---------------------|----------------------|------------------|------------|
| nonprovisional | YES          | \$700         | \$0                 | \$0                  | \$700            | 02/21/2007 |

| EXAMINER       | ART UNIT | CLASS-SUBCLASS |
|----------------|----------|----------------|
| NORMAN, MARC E | 3744     | 236-04600C     |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
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1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

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PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

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(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
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5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_

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| APPLICATION NO.                                                        | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|------------------------------------------------------------------------|-------------|----------------------|---------------------|------------------|
| 10/875,579                                                             | 06/24/2004  | Howard Rosen         | 0402.2A4            | 9842             |
| 51413                                                                  | 7590        | 11/21/2006           | EXAMINER            |                  |
| MARC E. HANKIN, ESQ.<br>11414 THURSTON CIRCLE<br>LOS ANGELES, CA 90049 |             |                      | NORMAN, MARC E      |                  |
|                                                                        |             |                      | ART UNIT            | PAPER NUMBER     |
|                                                                        |             |                      | 3744                |                  |
| DATE MAILED: 11/21/2006                                                |             |                      |                     |                  |

## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 241 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 241 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

NIT

|                               |                        |                     |  |
|-------------------------------|------------------------|---------------------|--|
| <b>Notice of Allowability</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                               | 10/875,579             | ROSEN, HOWARD       |  |
|                               | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                               | Marc E. Norman         | 3744                |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to response filed 6/28/06.
2. ☒ The allowed claim(s) is/are 1-16.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |                                                                                                            |                                                                                        |
|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 5. <input type="checkbox"/> Notice of Informal Patent Application                      |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 6. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____    | 7. <input type="checkbox"/> Examiner's Amendment/Comment                               |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance   |
|                                                                                                            | 9. <input type="checkbox"/> Other _____.                                               |

### REASONS FOR ALLOWANCE

Claims 1-16 are allowed.

The following is an examiner's statement of reasons for allowance:

As per independent claim 1, the Examiner accepts Applicant's arguments set forth in the response of 28 June 2006. The prior art (and in particular Hendricks) does not teach the programmable thermostat combination as recited, and in particular the control program features recited in subsections D.6.a and D.6.b of the claim.

As per independent claim 11, the prior art does not teach the programmable thermostat combination as recited, and in particular the receiver adapted to receive current time and date information from an external source of the current time and date, the receiver being coupled to the real time clock such that the time and date information thereof is updated from the receiver.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marc E. Norman whose telephone number is 571-272-4812. The examiner can normally be reached on Mon.-Fri., 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 3744

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MN



MARC NORMAN  
PRIMARY EXAMINER

|                                   |                                       |  |                                                             |             |
|-----------------------------------|---------------------------------------|--|-------------------------------------------------------------|-------------|
| <b>Notice of References Cited</b> | Application/Control No.<br>10/875,579 |  | Applicant(s)/Patent Under<br>Reexamination<br>ROSEN, HOWARD |             |
|                                   | Examiner<br>Marc E. Norman            |  | Art Unit<br>3744                                            | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * |   | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Name            | Classification |
|---|---|--------------------------------------------------|-----------------|-----------------|----------------|
| * | A | US-2003/0040842 A1                               | 02-2003         | Poth, Robert J. | 700/275        |
|   | B | US-                                              |                 |                 |                |
|   | C | US-                                              |                 |                 |                |
|   | D | US-                                              |                 |                 |                |
|   | E | US-                                              |                 |                 |                |
|   | F | US-                                              |                 |                 |                |
|   | G | US-                                              |                 |                 |                |
|   | H | US-                                              |                 |                 |                |
|   | I | US-                                              |                 |                 |                |
|   | J | US-                                              |                 |                 |                |
|   | K | US-                                              |                 |                 |                |
|   | L | US-                                              |                 |                 |                |
|   | M | US-                                              |                 |                 |                |

**FOREIGN PATENT DOCUMENTS**

| * |   | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Country | Name | Classification |
|---|---|--------------------------------------------------|-----------------|---------|------|----------------|
|   | N |                                                  |                 |         |      |                |
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|   | R |                                                  |                 |         |      |                |
|   | S |                                                  |                 |         |      |                |
|   | T |                                                  |                 |         |      |                |

**NON-PATENT DOCUMENTS**

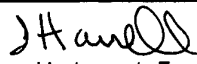
| * |   | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|-------------------------------------------------------------------------------------------|
|   | U |                                                                                           |
|   | V |                                                                                           |
|   | W |                                                                                           |
|   | X |                                                                                           |

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

|                                                                                                                  |                                |  |                                                |  |
|------------------------------------------------------------------------------------------------------------------|--------------------------------|--|------------------------------------------------|--|
| <b>Issue Classification</b><br> | <b>Application/Control No.</b> |  | <b>Applicant(s)/Patent under Reexamination</b> |  |
|                                                                                                                  | 10/875,579                     |  | ROSEN, HOWARD                                  |  |
|                                                                                                                  | <b>Examiner</b>                |  | <b>Art Unit</b>                                |  |
|                                                                                                                  | Marc E. Norman                 |  | 3744                                           |  |

| ISSUE CLASSIFICATION         |   |          |   |       |                    |                                   |     |  |  |  |
|------------------------------|---|----------|---|-------|--------------------|-----------------------------------|-----|--|--|--|
| ORIGINAL                     |   |          |   |       | CROSS REFERENCE(S) |                                   |     |  |  |  |
| CLASS                        |   | SUBCLASS |   |       | CLASS              | SUBCLASS (ONE SUBCLASS PER BLOCK) |     |  |  |  |
| 236                          |   | 46C      |   |       | 236                | 94                                |     |  |  |  |
| INTERNATIONAL CLASSIFICATION |   |          |   |       | 62                 | 157                               | 231 |  |  |  |
| G                            | 0 | 5        | D | 23/19 | 700                | 276                               |     |  |  |  |
| G                            | 0 | 5        | D | 23/32 |                    |                                   |     |  |  |  |
| F                            | 2 | 5        | B | 17/00 |                    |                                   |     |  |  |  |
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| <del>(Assistant Examiner)</del> (Date)                                                                                   |  | <br><b>MARC NORMAN</b><br><b>PRIMARY EXAMINER</b><br>(Primary Examiner) | 11/3/06<br>(Date) | Total Claims Allowed: 16    |                         |
| <br>(Legal Instruments Examiner) (Date) |  |                                                                                                                                                          |                   | O.G.<br>Print Claim(s)<br>1 | O.G.<br>Print Fig.<br>5 |

| <input type="checkbox"/> Claims renumbered in the same order as presented by applicant |          | <input type="checkbox"/> CPA |          | <input type="checkbox"/> T.D. |          | <input type="checkbox"/> R.1.47 |          |
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| Final                                                                                  | Original | Final                        | Original | Final                         | Original | Final                           | Original |
| 1                                                                                      | 1        |                              | 31       |                               | 61       |                                 | 91       |
| 2                                                                                      | 2        |                              | 32       |                               | 62       |                                 | 92       |
| 4                                                                                      | 3        |                              | 33       |                               | 63       |                                 | 93       |
| 3                                                                                      | 4        |                              | 34       |                               | 64       |                                 | 94       |
| 5                                                                                      | 5        |                              | 35       |                               | 65       |                                 | 95       |
| 6                                                                                      | 6        |                              | 36       |                               | 66       |                                 | 96       |
| 8                                                                                      | 7        |                              | 37       |                               | 67       |                                 | 97       |
| 10                                                                                     | 8        |                              | 38       |                               | 68       |                                 | 98       |
| 7                                                                                      | 9        |                              | 39       |                               | 69       |                                 | 99       |
| 9                                                                                      | 10       |                              | 40       |                               | 70       |                                 | 100      |
| 11                                                                                     | 11       |                              | 41       |                               | 71       |                                 | 101      |
| 12                                                                                     | 12       |                              | 42       |                               | 72       |                                 | 102      |
| 14                                                                                     | 13       |                              | 43       |                               | 73       |                                 | 103      |
| 16                                                                                     | 14       |                              | 44       |                               | 74       |                                 | 104      |
| 13                                                                                     | 15       |                              | 45       |                               | 75       |                                 | 105      |
| 15                                                                                     | 16       |                              | 46       |                               | 76       |                                 | 106      |
|                                                                                        | 17       |                              | 47       |                               | 77       |                                 | 107      |
|                                                                                        | 18       |                              | 48       |                               | 78       |                                 | 108      |
|                                                                                        | 19       |                              | 49       |                               | 79       |                                 | 109      |
|                                                                                        | 20       |                              | 50       |                               | 80       |                                 | 110      |
|                                                                                        | 21       |                              | 51       |                               | 81       |                                 | 111      |
|                                                                                        | 22       |                              | 52       |                               | 82       |                                 | 112      |
|                                                                                        | 23       |                              | 53       |                               | 83       |                                 | 113      |
|                                                                                        | 24       |                              | 54       |                               | 84       |                                 | 114      |
|                                                                                        | 25       |                              | 55       |                               | 85       |                                 | 115      |
|                                                                                        | 26       |                              | 56       |                               | 86       |                                 | 116      |
|                                                                                        | 27       |                              | 57       |                               | 87       |                                 | 117      |
|                                                                                        | 28       |                              | 58       |                               | 88       |                                 | 118      |
|                                                                                        | 29       |                              | 59       |                               | 89       |                                 | 119      |
|                                                                                        | 30       |                              | 60       |                               | 90       |                                 | 120      |
|                                                                                        |          |                              |          |                               |          |                                 | 121      |
|                                                                                        |          |                              |          |                               |          |                                 | 122      |
|                                                                                        |          |                              |          |                               |          |                                 | 123      |
|                                                                                        |          |                              |          |                               |          |                                 | 124      |
|                                                                                        |          |                              |          |                               |          |                                 | 125      |
|                                                                                        |          |                              |          |                               |          |                                 | 126      |
|                                                                                        |          |                              |          |                               |          |                                 | 127      |
|                                                                                        |          |                              |          |                               |          |                                 | 128      |
|                                                                                        |          |                              |          |                               |          |                                 | 129      |
|                                                                                        |          |                              |          |                               |          |                                 | 130      |
|                                                                                        |          |                              |          |                               |          |                                 | 131      |
|                                                                                        |          |                              |          |                               |          |                                 | 132      |
|                                                                                        |          |                              |          |                               |          |                                 | 133      |
|                                                                                        |          |                              |          |                               |          |                                 | 134      |
|                                                                                        |          |                              |          |                               |          |                                 | 135      |
|                                                                                        |          |                              |          |                               |          |                                 | 136      |
|                                                                                        |          |                              |          |                               |          |                                 | 137      |
|                                                                                        |          |                              |          |                               |          |                                 | 138      |
|                                                                                        |          |                              |          |                               |          |                                 | 139      |
|                                                                                        |          |                              |          |                               |          |                                 | 140      |
|                                                                                        |          |                              |          |                               |          |                                 | 141      |
|                                                                                        |          |                              |          |                               |          |                                 | 142      |
|                                                                                        |          |                              |          |                               |          |                                 | 143      |
|                                                                                        |          |                              |          |                               |          |                                 | 144      |
|                                                                                        |          |                              |          |                               |          |                                 | 145      |
|                                                                                        |          |                              |          |                               |          |                                 | 146      |
|                                                                                        |          |                              |          |                               |          |                                 | 147      |
|                                                                                        |          |                              |          |                               |          |                                 | 148      |
|                                                                                        |          |                              |          |                               |          |                                 | 149      |
|                                                                                        |          |                              |          |                               |          |                                 | 150      |
|                                                                                        |          |                              |          |                               |          |                                 | 151      |
|                                                                                        |          |                              |          |                               |          |                                 | 152      |
|                                                                                        |          |                              |          |                               |          |                                 | 153      |
|                                                                                        |          |                              |          |                               |          |                                 | 154      |
|                                                                                        |          |                              |          |                               |          |                                 | 155      |
|                                                                                        |          |                              |          |                               |          |                                 | 156      |
|                                                                                        |          |                              |          |                               |          |                                 | 157      |
|                                                                                        |          |                              |          |                               |          |                                 | 158      |
|                                                                                        |          |                              |          |                               |          |                                 | 159      |
|                                                                                        |          |                              |          |                               |          |                                 | 160      |
|                                                                                        |          |                              |          |                               |          |                                 | 161      |
|                                                                                        |          |                              |          |                               |          |                                 | 162      |
|                                                                                        |          |                              |          |                               |          |                                 | 163      |
|                                                                                        |          |                              |          |                               |          |                                 | 164      |
|                                                                                        |          |                              |          |                               |          |                                 | 165      |
|                                                                                        |          |                              |          |                               |          |                                 | 166      |
|                                                                                        |          |                              |          |                               |          |                                 | 167      |
|                                                                                        |          |                              |          |                               |          |                                 | 168      |
|                                                                                        |          |                              |          |                               |          |                                 | 169      |
|                                                                                        |          |                              |          |                               |          |                                 | 170      |
|                                                                                        |          |                              |          |                               |          |                                 | 171      |
|                                                                                        |          |                              |          |                               |          |                                 | 172      |
|                                                                                        |          |                              |          |                               |          |                                 | 173      |
|                                                                                        |          |                              |          |                               |          |                                 | 174      |
|                                                                                        |          |                              |          |                               |          |                                 | 175      |
|                                                                                        |          |                              |          |                               |          |                                 | 176      |
|                                                                                        |          |                              |          |                               |          |                                 | 177      |
|                                                                                        |          |                              |          |                               |          |                                 | 178      |
|                                                                                        |          |                              |          |                               |          |                                 | 179      |
|                                                                                        |          |                              |          |                               |          |                                 | 180      |
|                                                                                        |          |                              |          |                               |          |                                 | 181      |
|                                                                                        |          |                              |          |                               |          |                                 | 182      |
|                                                                                        |          |                              |          |                               |          |                                 | 183      |
|                                                                                        |          |                              |          |                               |          |                                 | 184      |
|                                                                                        |          |                              |          |                               |          |                                 | 185      |
|                                                                                        |          |                              |          |                               |          |                                 | 186      |
|                                                                                        |          |                              |          |                               |          |                                 | 187      |
|                                                                                        |          |                              |          |                               |          |                                 | 188      |
|                                                                                        |          |                              |          |                               |          |                                 | 189      |
|                                                                                        |          |                              |          |                               |          |                                 | 190      |
|                                                                                        |          |                              |          |                               |          |                                 | 191      |
|                                                                                        |          |                              |          |                               |          |                                 | 192      |
|                                                                                        |          |                              |          |                               |          |                                 | 193      |
|                                                                                        |          |                              |          |                               |          |                                 | 194      |
|                                                                                        |          |                              |          |                               |          |                                 | 195      |
|                                                                                        |          |                              |          |                               |          |                                 | 196      |
|                                                                                        |          |                              |          |                               |          |                                 | 197      |
|                                                                                        |          |                              |          |                               |          |                                 | 198      |
|                                                                                        |          |                              |          |                               |          |                                 | 199      |
|                                                                                        |          |                              |          |                               |          |                                 | 200      |
|                                                                                        |          |                              |          |                               |          |                                 | 201      |
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|                                                                                        |          |                              |          |                               |          |                                 | 203      |
|                                                                                        |          |                              |          |                               |          |                                 | 204      |
|                                                                                        |          |                              |          |                               |          |                                 | 205      |
|                                                                                        |          |                              |          |                               |          |                                 | 206      |
|                                                                                        |          |                              |          |                               |          |                                 | 207      |
|                                                                                        |          |                              |          |                               |          |                                 | 208      |
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|                                                                                        |          |                              |          |                               |          |                                 | 210      |

# Search Notes



Application/Control No.

10/875,579

Examiner

Marc E. Norman

Applicant(s)/Patent under Reexamination

ROSEN, HOWARD

Art Unit

3744

## SEARCHED

| Class            | Subclass                 | Date    | Examiner |
|------------------|--------------------------|---------|----------|
| 236              | { 94<br>1C<br>46R<br>46C | 3/21/08 | MM       |
| 62               | { 157<br>231             |         |          |
| update above     |                          |         |          |
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## INTERFERENCE SEARCHED

| Class        | Subclass | Date    | Examiner |
|--------------|----------|---------|----------|
| see attached | {        | 11/3/06 | MM       |
| search       |          |         |          |
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## SEARCH NOTES (INCLUDING SEARCH STRATEGY)

|                                                         | DATE    | EXMR |
|---------------------------------------------------------|---------|------|
| EAST search<br>(see attached 1)<br>Inventor Name Search | 3/21/06 | MM   |
| update EAST search                                      | 11/3/06 | MM   |
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**Marc E. Norman**

3744

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update/interfer search

10/875,579

|    | Type | L # | Hits | Search Text                                                                                                                                         | DBs                                   |
|----|------|-----|------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| 1  | IS&R | L1  | 721  | (236/94).CCLS.                                                                                                                                      | US-PGPUB; USPAT;<br>EPO; JPO; DERWENT |
| 2  | IS&R | L2  | 902  | (236/1c).CCLS.                                                                                                                                      | US-PGPUB; USPAT;<br>EPO; JPO; DERWENT |
| 3  | IS&R | L3  | 1901 | (236/46r).CCLS.                                                                                                                                     | US-PGPUB; USPAT;<br>EPO; JPO; DERWENT |
| 4  | IS&R | L4  | 79   | (236/46c).CCLS.                                                                                                                                     | US-PGPUB; USPAT;<br>EPO; JPO; DERWENT |
| 5  | IS&R | L5  | 578  | (62/157).CCLS.                                                                                                                                      | US-PGPUB; USPAT;<br>EPO; JPO; DERWENT |
| 6  | IS&R | L6  | 338  | (62/231).CCLS.                                                                                                                                      | US-PGPUB; USPAT;<br>EPO; JPO; DERWENT |
| 7  | BRS  | L7  | 3    | (thermostat and sens\$3<br>and clock and (ram or<br>(random adj access adj<br>memory)) and<br>time).clm.                                            | US-PGPUB; USPAT;<br>EPO; JPO; DERWENT |
| 8  | BRS  | L8  | 2    | (thermostat and sens\$3<br>and clock and (ram or<br>(random adj access adj<br>memory)) and time and<br>power).clm.                                  | US-PGPUB; USPAT;<br>EPO; JPO; DERWENT |
| 9  | BRS  | L9  | 0    | (thermostat and sens\$3<br>and clock and (ram or<br>(random adj access adj<br>memory)) and time and<br>power and (start\$3 or<br>restart\$3)).clm.  | US-PGPUB; USPAT;<br>EPO; JPO; DERWENT |
| 10 | BRS  | L10 | 0    | (thermostat and sens\$3<br>and clock and (ram or<br>(random adj access adj<br>memory)) and time and<br>((loss or interrupt\$4)<br>adj3 power)).clm. | US-PGPUB; USPAT;<br>EPO; JPO; DERWENT |
| 11 | BRS  | L11 | 0    | (thermostat and sens\$3<br>and clock and (ram or<br>(random adj access adj<br>memory)) and time and<br>volatile).clm.                               | US-PGPUB; USPAT;<br>EPO; JPO; DERWENT |

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| 12 | BRS | L12 | 0 | (thermostat and sens\$3<br>and clock and (ram or<br>(random adj access adj<br>memory)) and time and<br>nonvolatile).clm. | US-PGPUB; USPAT;<br>EPO; JPO; DERWENT |
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|    | Type | L # | Hits   | Search Text                                                                                                      | DBs                                |
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| 13 | BRS  | L13 | 1      | (thermostat and sens\$3 and (real adj time adj clock) and (ram or (random adj access adj memory)) and time).clm. | US-PGPUB; USPAT; EPO; JPO; DERWENT |
| 14 | IS&R | L14 | 269    | (700/275).CCLS.                                                                                                  | US-PGPUB; USPAT; EPO; JPO; DERWENT |
| 15 | IS&R | L15 | 378    | (700/276).CCLS.                                                                                                  | US-PGPUB; USPAT; EPO; JPO; DERWENT |
| 16 | BRS  | L16 | 181    | (14 or 15) and thermostat                                                                                        | US-PGPUB; USPAT; EPO; JPO; DERWENT |
| 17 | BRS  | L17 | 588823 | 16 (ram or (random adj access adj memory))                                                                       | US-PGPUB; USPAT; EPO; JPO; DERWENT |
| 18 | BRS  | L18 | 55     | 16 and (ram or (random adj access adj memory))                                                                   | US-PGPUB; USPAT; EPO; JPO; DERWENT |
| 19 | BRS  | L19 | 33     | 16 and (thermostat and sens\$3 and clock and (ram or (random adj access adj memory)) and time)                   | US-PGPUB; USPAT; EPO; JPO; DERWENT |
| 20 | BRS  | L20 | 17     | 16 and (thermostat and sens\$3 and clock and (ram or (random adj access adj memory)) and time and volatile)      | US-PGPUB; USPAT; EPO; JPO; DERWENT |

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**  
**UNITED STATES PATENT APPLICATION**

|                                   |   |                           |
|-----------------------------------|---|---------------------------|
| In re Application of :            | ) |                           |
|                                   | ) | Examiner: Norman, Marc E. |
| Rosen, Howard                     | ) |                           |
|                                   | ) | Art Unit: 3744            |
| Application No: 10/875,579        | ) |                           |
|                                   | ) |                           |
| Filed: 06/24/2004                 | ) |                           |
|                                   | ) |                           |
| Name: PROGRAMMABLE THERMOSTAT)    | ) |                           |
| EMPLOYING A FAIL SAFE REAL TIME ) | ) |                           |
| CLOCK                             | ) |                           |
|                                   | ) |                           |

**RESPONSE TO OFFICE ACTION**

Dear Mr. Norman:

We write in response to the Office Action dated March 29, 2006 in the above referenced U.S. Patent Application. Applicant thanks the Examiner for his time and assistance in reviewing the application and writes to provide the following in response.

**Claim Rejections - 35 USC § 102**

The Office Action indicates a rejection of Claims 1-4 pursuant to 35 USC § 102, for being unpatentable over Hendricks (U.S. Patent No. 4,431,134). Specifically, the Office Action cites Hendricks for disclosing a back-up power system for the clock and programmable settings in a thermostat. While Hendricks and other systems known in the art do disclose back-up power systems for thermostats, the Applicant's disclosure represents a significant improvement and widely differing system for providing fail safe protection of clock settings in a thermostat.

These back-up power systems are designed, generally, to deal with the problem of

losing clock settings in a thermostat during a power outage. While the time in an individual thermostat may be re-programmed easily, correcting the time in a large number of thermostats, for example in a hotel, can be a daunting task. Thus, conventional prior art systems seek to back-up the power to the RAM in the thermostat in one of two ways: first, by using rechargeable batteries or, second (as disclosed by Hendricks), by using a capacitor that stores power. Both of these systems, however, have several shortcomings. First, both rechargeable batteries and capacitors have a finite useful lifetime after which period they are no longer reliable. Second, while these items are sometimes replaceable, proper maintenance is oftentimes not performed by owners. Thus, if a power outage occurs several years after the thermostats have been installed, these conventional systems are ineffective in providing back-up power to the thermostat's memory.

The Applicant's system is directed towards overcoming these shortcomings by disclosing a fail safe system that provides back-up to a thermostat's clock data, even in cases where the conventional systems would fail to operate. The Applicant's system operates by periodically writing clock and data settings to a non-volatile memory (commonly referred to as one of: NVRAM, NVROM, or EEROM) within the thermostat. Because non-volatile memory systems (*e.g.*, NVRAM, NVROM, or EEROM) do not rely upon power to store information, the information from the last periodic writing is maintained by the thermostat, despite the power outage. Thus, when power is restored to the system, the thermostat will resume operation with the clock running from the last restored time. If, for example, a power outage occurs 45 minutes after a periodic writing to the non-volatile memory, when power is restored, the thermostat may resume

operations, although the time setting will be inaccurate by approximately 45 minutes. This inaccuracy, nevertheless, represents a vast improvement over conventional thermostats, which would be restored to the default time and date settings. That is, the thermostat will operate the HVAC system approximately the same as it would have operated absent the power outage. While, in most applications, a time difference of 45 minutes (or even 90 minutes) from reality would not be an acceptable operational mode, for thermostats it would be much better for the system to operate at Noon on a Summer day as if it were 11:00 a.m., rather than Midnight on January 1, as with many prior art systems. Therefore, the Applicant's invention represents a sizable and important improvement over prior art systems, including Hendricks.

Hendricks' patent teaches the conventional power back-up systems known within the art that use capacitors to store power. (Abstract lines 16-30, Claim 1 lines 43-47). While Hendricks' system is useful to provide protection for power outages, it is necessarily limited because they rely upon capacitors, which have a useful life of several years. Once the capacitors no longer operate properly, Hendricks' system will no longer provide back-up power. This will be very frustrating and expensive in applications such as hotels, where hundreds of thermostats may need to be re-programmed with the correct time after a power outage. The Applicant's system, on the other hand, will continue to operate with reasonable accuracy for several years to come because it does not rely upon a capacitor to provide power to the system.

Thus, the Applicant respectfully requests reconsideration rejection of Claims 1-4. In light of the foregoing, the Applicant's invention is both novel and represents a substantial functional improvement over the prior art systems known within the art.

**Claim Rejections – 35 USC § 103**

The Office Action indicates rejection of Claims 2-4 on the additional grounds that they are obvious, pursuant to 35 USC § 103, in light of Hendricks. The Office Action further indicates that “it would have been obvious to one of ordinary skill the art to combine the nonvolatile memory therewith for the simple purpose of compact design.” The Applicant respectfully contends that the invention represents a substantial, unobvious improvement over the prior art, including Hendricks.

As discussed above, non-volatile memory (*e.g.*, NVRAM, NVROM, or EEROM) are utilized in the system in order to provide a fail safe back-up source of data to the thermostat, not solely for the “simple purpose of compact design”. The use of non-volatile memory in this context provides a substantial functional improvement over the prior art systems, including Hendricks. Simply put, the Applicant’s system will continue to provide reasonably accurate back-up data in situations where the prior art systems will not. This improvement is not merely to provide a compact design, but rather, is an unanticipated functional improvement that is not obvious in view of Hendricks, either alone, or in combination with any other prior art system or component of a system.

As such, the Applicant’s system is unobvious in light of the factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966). The most relevant of these inquiries, “(2) Ascertaining the differences between the prior art and the claims at issue,” weighs heavily in favor of unobviousness in comparing these two systems. *First*, the Applicant’s system is a substantial improvement over prior art systems because it performs in situations where the prior art systems will fail. *Second*, the Applicant’s system, by employing non-volatile memory rather than capacitors,

utilizes a different technology than the prior art systems. *Finally*, the Applicant discloses a fail safe system that may be used in conjunction with one or more of the prior art systems to ensure reasonably accurate backup of data, even when the prior art systems fail. Thus, the Applicant's system is a substantial and unobvious improvement over the prior art systems.

Therefore, the Applicant respectfully requests reconsideration of the rejection of Claims 2-4 on the basis of 35 USC § 103 for obviousness.

**Claim Rejections – 35 USC § 103**

The Office Action indicates that Claims 11-16 are allowed. The Office Action also indicates that Claims 5-10 would be allowable if rewritten in independent form, if Claims 1-4 fail to be allowed. Based on the discussion above, Applicant respectfully submits that Claims 5-10 should be allowable as currently written, without amendment.

**CONCLUSION**

Applicant respectfully requests reconsideration of the patent application in light of the foregoing and respectfully submits that all of Applicant's Claims, 1-16, should be allowed as currently written. The Examiner is invited to contact Applicant's undersigned counsel by e-mail (Marc@HankinPatentLaw.com) or by telephone at (310) 892-1613 to expedite the prosecution of this case should there be any unresolved matters remaining.

Respectfully Submitted,

Dated: June 28, 2006

/Marc E. Hankin/

Marc E. Hankin

## Electronic Acknowledgement Receipt

|                                          |                                                               |
|------------------------------------------|---------------------------------------------------------------|
| <b>EFS ID:</b>                           | 1095996                                                       |
| <b>Application Number:</b>               | 10875579                                                      |
| <b>Confirmation Number:</b>              | 9842                                                          |
| <b>Title of Invention:</b>               | Programmable thermostat employing a fail safe real time clock |
| <b>First Named Inventor:</b>             | Howard Rosen                                                  |
| <b>Customer Number:</b>                  | 51413                                                         |
| <b>Filer:</b>                            | Marc E. Hankin/Grace Pak                                      |
| <b>Filer Authorized By:</b>              | Marc E. Hankin                                                |
| <b>Attorney Docket Number:</b>           | 0402.2A4                                                      |
| <b>Receipt Date:</b>                     | 28-JUN-2006                                                   |
| <b>Filing Date:</b>                      | 24-JUN-2004                                                   |
| <b>Time Stamp:</b>                       | 16:35:01                                                      |
| <b>Application Type:</b>                 | Utility                                                       |
| <b>International Application Number:</b> |                                                               |

### Payment information:

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|------------------------|----|
| Submitted with Payment | no |
|------------------------|----|

### File Listing:

| Document Number | Document Description                             | File Name                                  | File Size(Bytes) | Multi Part | Pages |
|-----------------|--------------------------------------------------|--------------------------------------------|------------------|------------|-------|
| 1               | Applicant Arguments/Remarks Made in an Amendment | HowardRosenEEROM-Resp onsetoOA03-29-06.pdf | 42518            | no         | 5     |

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <b>Warnings:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |
| <b>Information:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |
| <b>Total Files Size (in bytes):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 42518 |
| <p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b><br/> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b><br/> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> |       |



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| APPLICATION NUMBER | FILING OR 371 (c) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|--------------------|------------------------|-----------------------|------------------------|
| 10/875,579         | 06/24/2004             | Howard Rosen          | 0402.2A4               |

51413  
 MARC E. HANKIN, ESQ.  
 11414 THURSTON CIRCLE  
 LOS ANGELES, CA 90049

CONFIRMATION NO. 9842



\*OC000000018434778\*

Date Mailed: 03/31/2006

## NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/16/2006.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

MELKAM BEYENE  
 MELKAM BEYENE  
 PTOSS (703) 305-3006

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| APPLICATION NUMBER | FILING OR 371 (c) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|--------------------|------------------------|-----------------------|------------------------|
| 10/875,579         | 06/24/2004             | Howard Rosen          | 0404.2A4               |

David T. Bracken  
 The Law Office of David T. Bracken  
 4839 Bond Avenue  
 Orange, CA 92869

CONFIRMATION NO. 9842



\*OC000000018434773\*

Date Mailed: 03/31/2006

## NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/16/2006.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

*M. Beyene*  
 \_\_\_\_\_  
 MELKAM BEYENE  
 PTOSS (703) 305-3006

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www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/875,579      | 06/24/2004  | Howard Rosen         | 0404.2A4            | 9842             |

7590 03/29/2006  
David T. Bracken  
The Law Office of David T. Bracken  
4839 Bond Avenue  
Orange, CA 92869

EXAMINER

NORMAN, MARC E

ART UNIT PAPER NUMBER

3744

DATE MAILED: 03/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                                      |                                      |  |
|------------------------------|--------------------------------------|--------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/875,579 | <b>Applicant(s)</b><br>ROSEN, HOWARD |  |
|                              | <b>Examiner</b><br>Marc E. Norman    | <b>Art Unit</b><br>3744              |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 June 2004.
- 2a) ☐ This action is **FINAL**.
- 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11-16 is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☒ Claim(s) 5-10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 June 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All   b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 6/24/04; 2/7/05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Hendricks et al.

As per claim 1, Hendricks et al. discloses a thermostat comprising a main power source associated with the AC system, interactive interface (Figure 1), temperature sensor 96, processing unit 48 having a RAM memory 79 associated therewith, an input/output unit with sensor input and control output (Figure 2A), real time clock 50, the real time clock reading current time/date information into the memory at intervals (column 4, lines 1-21), and upon restart after a loss and then return of power from said space conditioning equipment, retrieving the time and date information from the RAM (Abstract, lines 16-22).

As per claim 3, Hendricks et al. discloses a vacation mode (column 8, line 26).

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

Art Unit: 3744

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hendricks et al.

As per claim 2, official notice is taken that since the thermostat already has a memory associated with it, it would have been obvious to one of ordinary skill in the art to combine the nonvolatile memory therewith for the simple purpose of compact design.

As per claims 4, see similar claim 3, above.

***Allowable Subject Matter***

Claims 5-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 11-16 are allowed.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marc E. Norman whose telephone number is 571-272-4812. The examiner can normally be reached on Mon.-Fri., 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MN



**MARC NORMAN  
PRIMARY EXAMINER**

|                                                                                                                                               |   |    |   |                          |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---|----|---|--------------------------|-----------|
| Substitute for form 1449A/PTO<br><br><b>INFORMATION DISCLOSURE<br/>STATEMENT BY APPLICANT</b><br><br><i>(use as many sheets as necessary)</i> |   |    |   | <b>Complete if Known</b> |           |
|                                                                                                                                               |   |    |   | Application Number       |           |
|                                                                                                                                               |   |    |   | Filing Date              |           |
|                                                                                                                                               |   |    |   | First Named Inventor     | Rosen     |
|                                                                                                                                               |   |    |   | Group Art Unit           |           |
|                                                                                                                                               |   |    |   | Examiner Name            |           |
| Sheet                                                                                                                                         | 1 | of | 1 | Attorney Docket Number   | 0208.2cA4 |

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|                       |                                                                                     |                    |        |
|-----------------------|-------------------------------------------------------------------------------------|--------------------|--------|
| Examiner<br>Signature |  | Date<br>Considered | 3/2/01 |
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> Unique citation designation number. <sup>2</sup> See attached Kinds of U.S. Patent Documents. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup> Applicant is to place a check mark here if English language Translation is attached.

**Burden Hour Statement:** This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U. S. Patent and Trademark Office, Washington, DC 20231. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.**

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U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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| Substitute for form 1449A/PTO<br><br><b>INFORMATION DISCLOSURE<br/>STATEMENT BY APPLICANT</b><br><br><i>(use as many sheets as necessary)</i> |   |    |   | <b>Complete if Known</b> |          |
|                                                                                                                                               |   |    |   | Application Number       |          |
|                                                                                                                                               |   |    |   | Filing Date              |          |
|                                                                                                                                               |   |    |   | First Named Inventor     | ROSEN    |
|                                                                                                                                               |   |    |   | Group Art Unit           |          |
|                                                                                                                                               |   |    |   | Examiner Name            |          |
| Sheet                                                                                                                                         | 1 | of | 1 | Attorney Docket Number   | 0404.2A4 |

[illegible][illegible]

|                       |                                                                                     |                    |         |
|-----------------------|-------------------------------------------------------------------------------------|--------------------|---------|
| Examiner<br>Signature |  | Date<br>Considered | 3/21/01 |
|-----------------------|-------------------------------------------------------------------------------------|--------------------|---------|

<sup>1</sup> Unique citation designation number. <sup>2</sup> See attached Kinds of U.S. Patent Documents. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup> Applicant is to place a check mark here if English language Translation is attached.

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|                                   |                                       |  |                                                             |             |
|-----------------------------------|---------------------------------------|--|-------------------------------------------------------------|-------------|
| <b>Notice of References Cited</b> | Application/Control No.<br>10/875,579 |  | Applicant(s)/Patent Under<br>Reexamination<br>ROSEN, HOWARD |             |
|                                   | Examiner<br>Marc E. Norman            |  | Art Unit<br>3744                                            | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * |   | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Name             | Classification |
|---|---|--------------------------------------------------|-----------------|------------------|----------------|
| * | A | US-2003/0121652 A1                               | 07-2003         | Carey et al.     | 165/238        |
| * | B | US-5,460,327                                     | 10-1995         | Hill et al.      | 236/46R        |
| * | C | US-4,431,134                                     | 02-1984         | Hendricks et al. | 236/46R        |
| * | D | US-4,267,966                                     | 05-1981         | Neel et al.      | 236/46A        |
|   | E | US-                                              |                 |                  |                |
|   | F | US-                                              |                 |                  |                |
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**FOREIGN PATENT DOCUMENTS**

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**NON-PATENT DOCUMENTS**

| * |   | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|-------------------------------------------------------------------------------------------|
|   | U |                                                                                           |
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\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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**Marc E. Norman**

3744

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| INTERFERENCE SEARCHED |          |      |          |
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| Class                 | Subclass | Date | Examiner |
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# Index of Claims



Application/Control No.

10/875,579

Examiner

Marc E. Norman

Applicant(s)/Patent under Reexamination

ROSEN, HOWARD

Art Unit

3744

|   |          |
|---|----------|
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Bib Data Sheet

CONFIRMATION NO. 9842

|                             |                                       |              |                        |                                    |
|-----------------------------|---------------------------------------|--------------|------------------------|------------------------------------|
| SERIAL NUMBER<br>10/875,579 | FILING DATE<br>06/24/2004<br><br>RULE | CLASS<br>236 | GROUP ART UNIT<br>3744 | ATTORNEY<br>DOCKET NO.<br>0404.2A4 |
|-----------------------------|---------------------------------------|--------------|------------------------|------------------------------------|

APPLICANTS

Howard Rosen, Hampstead, CANADA;

\*\* CONTINUING DATA \*\*\*\*\*

~~This application is a CIP of 10/060,768 01/30/2002 PAT 6,824,009~~ *see amdt 1 2/5/05*

\*\* FOREIGN APPLICATIONS \*\*\*\*\*

IF REQUIRED, FOREIGN FILING LICENSE GRANTED \*\* SMALL ENTITY \*\*

\*\* 08/10/2004

|                                                                                                                                                           |                               |                                   |                       |                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------|-----------------------|----------------------------|
| Foreign Priority claimed<br><input type="checkbox"/> yes <input checked="" type="checkbox"/> no                                                           | STATE OR<br>COUNTRY<br>CANADA | SHEETS<br>DRAWING<br>5            | TOTAL<br>CLAIMS<br>16 | INDEPENDENT<br>CLAIMS<br>2 |
| 35 USC 119 (a-d) conditions<br>met<br><input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> Met after<br>Allowance | Verified and<br>Acknowledged  | Examiner's Signature<br><i>MW</i> | Initials              |                            |

ADDRESS

David T. Bracken  
 The Law Office of David T. Bracken  
 4839 Bond Avenue  
 Orange , CA  
 92869

TITLE

Programmable thermostat employing a fail safe real time clock

|                                   |                                                                                                                   |                                                                                                                                                                                                                                                 |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FILING FEE<br><br>RECEIVED<br>385 | FEES: Authority has been given in Paper<br>No. _____ to charge/credit DEPOSIT ACCOUNT<br>No. _____ for following: | <input type="checkbox"/> All Fees<br><input type="checkbox"/> 1.16 Fees ( Filing )<br><input type="checkbox"/> 1.17 Fees ( Processing Ext. of<br>time )<br><input type="checkbox"/> 1.18 Fees ( Issue )<br><input type="checkbox"/> Other _____ |
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|  | <input type="checkbox"/> Credit |
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10/875, 579

|    | Type | Ref # | Hits   | Search Text                 | DBs                                      |
|----|------|-------|--------|-----------------------------|------------------------------------------|
| 1  | BRS  | S1    | 13584  | real adj time adj clock     | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 2  | BRS  | S3    | 144863 | (time or date) near3 memory | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 3  | BRS  | S2    | 54     | S1 with thermostat          | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 4  | BRS  | S5    | 79077  | power near3 loss            | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 5  | BRS  | S6    | 1      | S4 and S5                   | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 6  | BRS  | S7    | 92006  | power near5 loss            | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 7  | BRS  | S8    | 1      | S4 and S7                   | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 8  | BRS  | S4    | 31     | S2 and S3                   | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 9  | BRS  | S10   | 124    | S9 and S3                   | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 10 | BRS  | S11   | 20     | S7 and S10                  | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 11 | BRS  | S12   | 80     | S1 same thermostat          | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 12 | BRS  | S9    | 339    | S1 and thermostat           | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 13 | BRS  | S13   | 0      | S12 same S7                 | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 14 | BRS  | S14   | 390    | S3 same S7                  | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 15 | BRS  | S15   | 9      | S14 and thermostat          | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |

|    | Type | Ref # | Hits   | Search Text                                                                                                                                                                              | DBs                                      |
|----|------|-------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| 16 | IS&R | S16   | 12     | ((("4224615") or ("5086385") or ("5170935") or ("5818428") or ("6059195") or ("6192282") or ("6285912") or ("6330806") or ("6344861") or ("6478233") or ("6595430") or ("6621507"))).PN. | US-PGPUB; USPAT                          |
| 17 | IS&R | S17   | 4      | ((("4818428") or ("5170935") or ("6344861") or ("4224615"))).PN.                                                                                                                         | US-PGPUB; USPAT                          |
| 18 | BRS  | S18   | 3      | (US-20030121652-\$ or US-20030090374-\$).did. or (US-5460327-\$).did.                                                                                                                    | US-PGPUB; USPAT                          |
| 19 | BRS  | S19   | 2      | S18 and sensor                                                                                                                                                                           | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 20 | BRS  | S21   | 3      | S18 and sens\$3                                                                                                                                                                          | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 21 | BRS  | S24   | 1      | S21 and (real adj time adj clock)                                                                                                                                                        | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 22 | BRS  | S25   | 6      | ("4267966"   "4431134"   "5251813"   "5277363").PN.<br>OR ("5460327").URPN.                                                                                                              | US-PGPUB; USPAT;<br>USOCR                |
| 23 | BRS  | S20   | 2      | S18 and (ram or (random adj access adj memory))                                                                                                                                          | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 24 | BRS  | S22   | 2      | S20 and sens\$3                                                                                                                                                                          | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 25 | BRS  | S26   | 3      | S18 and memory                                                                                                                                                                           | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 26 | BRS  | S27   | 3      | S26 and sens\$3                                                                                                                                                                          | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 27 | BRS  | S23   | 0      | S22 and (real adj time adj clock)                                                                                                                                                        | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 28 | BRS  | S29   | 117376 | power near3 (loss or failure)                                                                                                                                                            | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 29 | BRS  | S30   | 1      | S28 and S29                                                                                                                                                                              | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |

|    | Type | Ref # | Hits   | Search Text                               | DBs                                      |
|----|------|-------|--------|-------------------------------------------|------------------------------------------|
| 30 | BRS  | S31   | 0      | S18 and vacation                          | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 31 | IS&R | S33   | 2      | ("6824069").PN.                           | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 32 | IS&R | S34   | 700    | (236/94).CCLS.                            | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 33 | IS&R | S35   | 878    | (236/1c).CCLS.                            | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 34 | IS&R | S36   | 1894   | (236/46r).CCLS.                           | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 35 | IS&R | S37   | 77     | (236/46c).CCLS.                           | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 36 | IS&R | S38   | 554    | (62/157).CCLS.                            | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 37 | IS&R | S39   | 334    | (62/231).CCLS.                            | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 38 | BRS  | S40   | 121172 | S34 or S35 or S36 or S37 or<br>S38 or S29 | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 39 | BRS  | S41   | 4200   | S34 or S35 or S36 or S37 or<br>S38 or S39 | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 40 | BRS  | S28   | 1      | S27 and (real adj time adj<br>clock)      | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 41 | BRS  | S42   | 60     | S41 and (real adj time adj<br>clock)      | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 42 | BRS  | S43   | 51     | S42 and thermostat                        | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 43 | BRS  | S44   | 16     | S43 and S29                               | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 44 | BRS  | S45   | 18     | S42 and S29                               | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |

|    | Type | Ref # | Hits | Search Text          | DBs                                      |
|----|------|-------|------|----------------------|------------------------------------------|
| 45 | BRS  | S32   | 1    | S18 and nonvolatile  | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 46 | BRS  | S46   | 2    | S45 and nonvolatile  | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |
| 47 | BRS  | S47   | 3    | S45 and non-volatile | US-PGPUB; USPAT;<br>EPO; JPO;<br>DERWENT |

|                                                                                                                    |                        |              |
|--------------------------------------------------------------------------------------------------------------------|------------------------|--------------|
| <b>REVOCATION OF POWER OF ATTORNEY WITH<br/>NEW POWER OF ATTORNEY<br/>AND<br/>CHANGE OF CORRESPONDENCE ADDRESS</b> | Application Number     | 10/875,579   |
|                                                                                                                    | Filing Date            | 6/24/2004    |
|                                                                                                                    | First Named Inventor   | Howard Rosen |
|                                                                                                                    | Art Unit               | 2173         |
|                                                                                                                    | Examiner Name          |              |
|                                                                                                                    | Attorney Docket Number | 0402.2A4     |

I hereby revoke all previous powers of attorney given in the above-identified application.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint the practitioners associated with the Customer Number:

51413

☒ Please change the correspondence address for the above-identified application to:

☒ The address associated with  
Customer Number:

51413

OR

☐ Firm or  
Individual Name

Address

City

State

Zip

Country

Telephone

Email

Marc@hankinpatentlaw.com

I am the:

☒ Applicant/Inventor.

☐ Assignee of record of the entire interest. See 37 CFR 3.71.  
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

**SIGNATURE of Applicant or Assignee of Record**

Signature

Name

Howard Rosen

Date

MARCH 15, 2006

Telephone

(514) 484-2021

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required. See below.

☐ \*Total of \_\_\_\_\_ forms are submitted.

This collection of information is required by 37 CFR 1.36. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2

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10/18



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Title: PROGRAMMABLE THERMOSTAT  
EMPLOYING A FAIL SAFE REAL TIME  
CLOCK

Inventor(s): Howard Rosen

Serial No.: 10/875,579

Filing Date: 6/24/2004

Group No.

Examiner:

Attorney Docket No.: 0402.2A4

PRELIMINARY AMENDMENT /  
REMARKS

COMMISSIONER FOR PATENTS

PO Box 1450

Alexandria, VA 22313-1450

Dear Sir:

Applicant submits the following preliminary amendment to the specification.

Specification: Please amend the specification as follows:

Page 1, line 3:

~~This application is a continuation in part of Serial No. 10/060,768 filed  
1/30/2002.~~

## REMARKS

This application was filed originally claiming benefit pursuant to 35 USC § 120 of the earlier filing date of:

US Patent No. 6,824,069  
Issued: November 30, 2004  
Title: PROGRAMMABLE THERMOSTAT SYSTEM EMPLOYING A  
TOUCH SCREEN UNIT FOR INTUITIVE INTERACTIVE INTERFACE  
WITH A USER  
Inventor(s): Howard Rosen  
Serial No. 10/060768  
Filing Date: 1/30/2002

Applicant hereby disclaims for the present application the benefit of the earlier filing date of Serial No. 10/060768 pursuant to 35 USC § 120 and accepts as the filing date of this application that date on which the application was actually filed with the USPTO, i.e., the filing date indicated above with this application's information.

All the claims of US Patent No. 6,824,069 are being disclaimed by the Applicant for the entire term of that patent. Applicant seeks to sever all connection between US Patent No. 6,824,069 and the present application.

Co-pending applications or issued patents that were originally filed as continuations in part of Serial No. 10/060768 are shown in the following list:

| Serial No. | Filing Date | Status  |
|------------|-------------|---------|
| 10/654,235 | 9/3/2003    | PENDING |
| 10/654,930 | 9/3/2003    | PENDING |
| 10/654,236 | 9/3/2003    | ISSUED  |
| 10/878,825 | 6/28/2004   | PENDING |
| 10/875,579 | 6/24/2004   | PENDING |
| 29/179,077 | 4/4/2003    | ISSUED  |

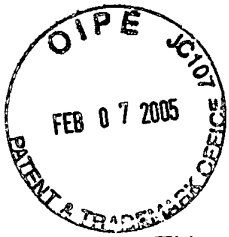
All benefit of the earlier filing date of Serial No. 10/060768 as to the above are being disclaimed as well. Submitted with this preliminary amendment is a supplemental disclosure of additional references. Applicant has only recently become aware of these references in relation to pursuing a business transaction.

Respectfully submitted,

February 4, 2005



David T. Bracken  
Reg. No. 37,522



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Title: PROGRAMMABLE THERMOSTAT  
EMPLOYING A FAIL SAFE REAL TIME CLOCK  
Inventor(s): Howard Rosen  
Serial No.: 10/875,579  
Filing Date: 6/24/2004  
Group No.  
Examiner:  
Attorney Docket No.: 0402.2A4

TRANSMITTAL LETTER:  
PRELIMINARY AMENDMENT

COMMISSIONER FOR PATENTS  
PO Box 1450  
Alexandria, VA 22313-1450

Sir:

Transmitted hereunder for filing is  
the above patent application and/or  
related documents as listed below.

CERTIFICATE OF MAILING (37 CFR 1.08)  
I, the person below signing this Certificate of Mailing,  
hereby certify that this document and the documents  
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Patents, PO Box 1450, Alexandria, VA 22313-1450

*D. Bracken*

Signature: David T. Bracken  
Date of Mailing: February 4, 2005

☒ Amendment / Remarks – 4 p.

☒ PTO SB/08A – 2 p.

☒ Information Disclosure Statement –  
Remarks – 3 p.

Address all correspondence to: David T. Bracken  
The Law Office of David T. Bracken  
4839 East Bond Avenue  
Orange, CA 92869  
Phone: 714-744-4798



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Title: PROGRAMMABLE THERMOSTAT  
EMPLOYING A FAIL SAFE REAL TIME  
CLOCK

Inventor(s): Howard Rosen

Serial No.: 10/875,579

Filing Date: 6/24/2004

Group No.

Examiner:

Attorney Docket No.: 0402.2A4

INFORMATION DISCLOSURE  
STATEMENT - REMARKS

COMMISSIONER FOR PATENTS

PO Box 1450

Alexandria, VA 22313-1450

Sir:

In accordance with the duty of disclosure under 37 C.F.R. 1.56 and pursuant to 37 C.F.R. 1.97-1.98, Applicant hereby notifies the U.S. Patent and Trademark Office of the documents listed on the attached Form PTO- PTO/SB/08A. Except as noted, one copy of the cited document is submitted herewith.

The submission of the listed documents is not intended as an admission that any such document constitutes prior art against the claims of the present application. Applicant reserves the right to dispute any of the listed documents as prior art during examination. Further, Applicant does not waive any right to take any action that would be appropriate to antedate or otherwise remove any listed document as a competent reference against the claims of the present application. Furthermore, the submission of this Information Disclosure Statement is not to be construed as a representation that a search has been made or that no other material information may exist. Applicant respectfully submits that all pending claims are patentable over the foregoing references, alone or in combination.

Although further described below, the following is brought more particularly to the examiner's attention. The reference titled "Cardio manual" discloses the broad idea of incorporating a dot-matrix liquid crystal display with touchscreen having virtual buttons responsive to a user's touch. Most relevant are pages 7, 16, 23, and 45 through 47.

The following are US patents:

4,224,615 discloses a generalized form of a touch screen for user input.

5,086,385 discloses that a personal computer may receive inputs such as temperature in its operation as a home automation system having a touchscreen interface.

5,170,935 describes using touchscreen up or down arrows to change comfort settings on a thermostat.

5,818,428 describes a touch screen for a PC or home appliance that can be changed in appearance after purchase by a user to make the interface more acceptable to the user.

6,059,195 discloses a home automation system suggesting use of a touchscreen for a portion of the user interface (copy not submitted).

6,192,282 discloses a home automation system including connections from a central control device to remote thermostats, where the central control device comprises a touchscreen as part of the user interface.

6,285,912 discloses a thermostat with what is described as a "touch panel" consisting of mechanical buttons.

6,330,806 discloses a thermostat suggesting that a touchscreen is one of several forms of user interfaces (copy is not submitted).

6,344,861, with an effective filing date of 1993, discloses that a handheld device such as a PDA may be used wirelessly to form an interface with a thermostat. (US Patent Nos. 5,866,697 and 6,020,881 are described in the '861 patent – copies not submitted).

6,478,233 discloses a thermostat implementing an algorithm for saving energy in the operation of HVAC equipment which in addition incorporates a touchscreen as part of a user interface.

6,595,430 discloses a graphical representation for scheduling control setpoints for a thermostat, optionally via a touchscreen.

6,621,507 discloses thermostat with a touchscreen interface for selection of language used for communication with the user.

The following are foreign patents or publications:

DE 3334117.6 published in 1985 discloses input of schedules of temperature control setpoints over a period of up to 72 hours by way of touching a light pen to a graphic pictorial on a display showing a graph of temperature versus time.

EP 0985994 discloses using transparent overlays on a touch sensitive layer to create different user interfaces with a touch pad. One of the user interfaces is used to input control setpoints for a thermostat.

WO 97/11448 discloses input of schedules of temperature control setpoints for an individual room over a period of up to 24 hours by way of touching a graphic pictorial on a display showing a graph of temperature versus time (US Patent No. 6,140,987 is described in the '448 publication – copy not submitted).

WO 97/39392 discloses a home automation system with a touchscreen interface .

The following are publications:

1. ADI, "Leopard User Manual," 93 pages, 2001. – discloses a home automation control center that allows a user to use a personal computer with proprietary software to develop a touchscreen pictorial for the touchscreen on the control center. The device is capable of displaying temperature without control of space conditioning equipment.
2. Business Wire, "MicroTouch Specialty Products Group to Capitalize on Growing Market for Low-Cost Digital Matrix Touchscreens," p1174 (2 pages), January 6, 1999. – discloses that a touchscreen panel can be used to control HVAC equipment.
3. DeKoven et al., "Designing Collaboration in Consumer Products," 2 pages,

2001. Freudenthal et al., "Communicating extensive smart home functionality to users of all ages: the design of a mixed-initiative multimodal thermostat-interface," pp. 34-39, March 12-13, 2001. – discloses research using a touchscreen and speech input to determine user response to programmable thermostats and their useful interfaces.
4. Honeywell News Release, "Honeywell's New Sysnet Facilities Integration System For Boiler Plant and Combustion Safety Processes," 4 pages, December 15, 1995. – describes using touchscreen controls for boiler operation.
  5. Honeywell, "W7006A Home Controller Gateway User Guide," 31 pages, July 2001. – discloses a home automation device with a mouse-driven indicator.
  6. "High-tech options take hold in new homes - 200-08-28 - Dallas Business Journal," <http://bizjournals.com/dallas/stories/2000/08/28/focus4>, 3 pages, dated August 28, 2000, printed August 19, 2004. – discloses a home management system using a touchscreen panel and icons.
  7. "Product Review - Philips Pronto Remote Control," [http://hometheaterhifi.com/volume 6 2/philipsprontoremotecontrol.html](http://hometheaterhifi.com/volume%206%20philipsprontoremotecontrol.html), 5 pages, dated May 1999, printed August 20, 2004. – discloses a handheld, "universal learning remote" device entirely based on a touchscreen for communicating control signals to entertainment devices.
  8. [http://www.cc.gatech.edu/computing/classes/cs6751\\_94\\_fall/2rroupc/climate-2/node 1 .html](http://www.cc.gatech.edu/computing/classes/cs6751_94_fall/2rroupc/climate-2/node%201.html), "Contents," 53 pages, printed September 20, 2004. – discloses student research into using a touchscreen as part of a user interface for a thermostat, among other devices.
  9. "HAI Company Background," [http://www.homeauto.com/AboutHAI/abouthai main.htm](http://www.homeauto.com/AboutHAI/abouthai_main.htm), 2 pages, printed August 19, 2004. – discloses that a touchscreen can be operated in a programmable thermostat.
  10. Cardio Manual, available at <http://www.secant.ca/En/Documentation/Cardio2e-Manual.pdf>, Cardio Home Automation Inc., 55 pages, printed September 28, 2004. – discloses a dot-matrix touchscreen thermostat with multiple screens for a user interface that can accomplish, among other things, scheduling multiple setpoints in a seven day period. Most important, page 7 of this reference discloses that pressing a virtual button on the touchscreen interface can cause the legends and functions to change only for virtual buttons other than the one pressed.
  11. "RC X10 Automation Forum: Control your Heating and Cooling System with Pronto(1/1)," [http://www.remotecentral.com/cgi-bin/lmboard/lrc-x 1 0/thread.c~i? 12](http://www.remotecentral.com/cgi-bin/lmboard/lrc-x%201%20/thread.c~i?12), 2 pages, dated April 23, 1999, printed August 20, 2004. – discloses that a Pronto controller can send X-10 signals on an AC powerline to thermostats adapted to receive such signals.

Respectfully submitted,

Dated: February 4, 2005



David T. Bracken  
Registration No. 37,522

Substitute for form 1449B/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet

of

Application Number

Filing Date

**First Named Inventor**

**Group Art Unit**

Examiner Name \_\_\_\_\_

Attorney Docket Number

#### OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS

| Examiner<br>Initials* | Cite<br>No. <sup>1</sup> | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | T <sup>2</sup> |
|-----------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
|                       |                          | <p>1. ADI, "Leopard User Manual," 93 pages, 2001.</p> <p>2. Business Wire, "MicroTouch Specialty Products Group to Capitalize on Growing Market for Low-Cost Digital Matrix Touchscreens," p1174 (2 pages), January 6, 1999.</p> <p>3. DeKoven et al., "Designing Collaboration in Consumer Products," 2 pages, 2001.</p> <p>Freudenthal et al., "Communicating extensive smart home functionality to users of all ages: the design of a mixed-initiative multimodal thermostat-interface," pp. 34-39, March 12-13, 2001.</p> <p>4. Honeywell News Release, "Honeywell's New Sysnet Facilities Integration System For Boiler Plant and Combustion Safety Processes," 4 pages, December 15, 1995. ✓</p> <p>5. Honeywell, "W7006A Home Controller Gateway User Guide," 31 pages, July 2001.</p> <p>6. "High-tech options take hold in new homes - 200-08-28 - Dallas Business Journal," <a href="http://bizjournals.com/dallas/stories/2000/08/28/focus4">http://bizjournals.com/dallas/stories/2000/08/28/focus4</a>, 3 pages, dated August 28, 2000, printed August 19, 2004. ✓</p> <p>7. "Product Review - Philips Pronto Remote Control," <a href="http://hometheaterhifi.com/volume62/philipsprontoremotecontrol.html">http://hometheaterhifi.com/volume62/philipsprontoremotecontrol.html</a>, 5 pages, dated May 1999, printed August 20, 2004.</p> <p>8. <a href="http://www.cc.gatech.edu/computing/classes/cs675194fall/2roupc/climate-2/node1.html">http://www.cc.gatech.edu/computing/classes/cs675194fall/2roupc/climate-2/node1.html</a>, "Contents," 53 pages, printed September 20, 2004.</p> <p>9. "HAI Company Background," <a href="http://www.homeauto.com/AboutHAI/abouthai_main.htm">http://www.homeauto.com/AboutHAI/abouthai_main.htm</a>, 2 pages, printed August 19, 2004.</p> <p>10. Cardio Manual, available at <a href="http://www.secant.ca/En/Documentation/Cardio2e-Manual.pdf">http://www.secant.ca/En/Documentation/Cardio2e-Manual.pdf</a>, Cardio Home Automation Inc., 55 pages, printed September 28, 2004.</p> <p>11. "RC X10 Automation Forum: Control your Heating and Cooling System with Pronto(1/1)," <a href="http://www.remotecentral.com/cgi-bin/mbboard/arc-x10/thread.c?i=12">http://www.remotecentral.com/cgi-bin/mbboard/arc-x10/thread.c?i=12</a>, 2 pages, dated April 23, 1999, printed August 20, 2004.</p> |                |

Examiner  
Signature

Date Considered

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> Unique citation designation number. <sup>2</sup> Applicant is to place a check mark here if English language Translation is attached.

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(71) Applicant:

Siemens AG, 1000 Berlin and 8000 Munich, GER

(72) Inventor:

Johne, Werner, 8021 Baierbrunn, GER

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(54) PROCEDURE FOR INPUT OF INFORMATION FOR PROCESS CONTROL AND/OR  
ADJUSTMENT BY MEANS OF AN INPUT DISPLAY UNIT IN COORDINATION WITH A  
PEN

For the input of set values into a set-value memory  
for process control and/or adjustment by means  
of a display unit in coordination with a pen.  
Coordination points can be entered with a  
Pen; after entering merely the corner dots of a  
desired graph into a coordinate system displayed by  
the input display unit, consisting of coordinates  
between these corner dots, the coordinates of the  
set-value graph located between the dots are  
determined by a microprocessor and stored as set  
values in the set-value memory. The input display  
unit then displays a coordinate system determined  
on the basis of prior input information, to be imaged,  
based on their physical dimensions and their units

[DIAGRAM]

Patent Claims

1. Procedure for the input of information for process control and/or adjustment by means of an input display unit in coordination with an input pen. Coordinate points can be entered into the display unit with the input pen. This procedure is characterized by the fact that for the input of set values into a set-value memory for process control and/or adjustment, upon entering merely the corner dots (E) of a desired set value graph (K) into a coordinate system created from these coordinates between these corner dots (E), a microprocessor (R) determines the coordinates of the interdots (Z) located between the corner dots (E) of the desired set value graph (K), which then, together with the coordinates of the corner points entered with a light pen (G), are stored in the set-value memory (S).
2. Procedure claimed in claim 1, characterized by the fact that the input display unit (B) displays a coordinate system determined by prior information based on the physical dimensions and their units to be imaged.

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SIEMENS CORPORATION  
Berlin and Munich

- 2 -

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**Procedure for Input of Information for Process Control and/or Adjustment by  
Means of an Input Display Unit Coordinated with an Input pen**

Set-point adjusters are frequently used for the control and/or adjustment of technical processes. With their help a time-dependent command variable for process control and adjustment is set so that the control and/or adjustment function variable always indicates its set value, i.e., the value it must have at any point in time. Function variables and command variables may involve different physical variables, e.g., temperature (and/or march of temperature ) as a function variable and an electrical signal imaging the march of temperature as a command variable. Such an electrical signal can be created by means of a set-point adjuster to store the path of the signal by optical or electrical means.

To achieve the desired course of the function variable, first a relevant signal path must be entered into the set-point adjuster. This can be achieved by an operator who keys the coordinate data of individual dots of the set-value graph in dot-by dot

In a different context, (cf. NTZ-Report15 [Journal of Communication Engineering], "Data Display Units", 1973, especially pp. 7, 9, 13, 44) there is a known procedure of entering graphs of function-curves into a graph memory by entering data of different graph dots into the input display unit in coordination with an input pen, e.g., a light pen, by entering coordinate dots with the input pen or by entering them dot-by-dot via a microprocessor. There are no connections provided to process elements, in particular for set-value output.

This method of entering a set-value path into a set-point adjuster dot-by-dot for process control and/or adjustment appears to be relatively time-consuming and particularly disturbing if set-value graphs have to be altered more or less frequently, as is the case in experimental runs.

However, (from DE-PS 25 10 632) the method of entering information via input display unit and pen, by entering coordinate dots by pen is currently known. Commands are entered by a light pen to the process by positioning the command on the corresponding symbolic process element.

This method of one display presupposing all commands possible for the process element concerned appears feasible for the input of relatively few commands, entered on an infrequent basis; otherwise the display of the commands as well as time consumed could turn problematic for the input of commands.

This invention points out a method for a less time-consuming input of set values into a set-value memory for process control and/or adjustment by means of an input display unit, together with an input pen, by entering into it coordinate points with the input pen. This invention involves a procedure for the input of set values into a memory for process control and adjustment by means of an input display unit, together with an input pen, by entering coordinate dots; according to the invention, this procedure is characterized by the fact that for the input of set values into a set value memory for process control and/or adjustment, following input of only the corner dots of a desired set value graph into a coordinate system displayed by the input display unit, the coordinates of the interdots located between the corner dots of the desired set value graph are determined by a microprocessor and subsequently stored as set values in a set-value memory, together with the coordinates of the corner dots entered by the light pen.

The invention which abandons the more extensive set-value input by a light pen, has the advantage of avoiding the time-consuming attempt to achieve utmost accuracy of the set-value graph while still being able to succeed in storing a computer-exact corner dot to corner dot set-value graph.

In further developing the invention, the input display unit can display a certain coordinate system based on previous input information pursuant to physical variables and their units to be imaged, having the advantage of entering set values of vastly different variables and dimensions into the connected set-point adjuster by means of one and the same display unit.

The diagram describes the invention in more detail.

The diagram represents a schematic view in a scope required for understanding the invention of an arrangement for input of set values into a set-value memory S, having an input display unit B coordinated with an input pen G. Although this is not shown in detail in the diagram, the input display unit B next to the actual display screen with associated deflecting control and brightness control can have central control and data memory which allows to input functional graphs with a light pen/input pen G dot-by-dot. The input display unit B is connected to a microprocessor R able to read the functional dots entered into the input display unit B from any location of the display screen and, conversely, can enter function dots in any location of the display screen. Microprocessor R is also connected to set-value memory S. In addition, the diagram shows that the display screen can be provided with virtual keys (located on the right-hand side in the diagram) ("24 H", "48 h", "72 h", "° C"), which can be "activated" by a light pen G as a so-called key-simulation.

For the input of process control and/or adjustment set values, e.g. temperature set values for climatic test cabinets, where set-value memory S functions, a schematic arrangement is depicted in the following diagram

An operator may have already entered information over a desired time period of 24 hours by a light pen G as a keyboard simulation, during which period set values are supposed to appear, so that horizontal scaling has been set on the display screen for set-value input; furthermore, again by way of keyboard simulation, information may have been entered about the set values to be determined for the physical variable, for example, the temperature in ° C, so that for set value input vertical scaling has been set on the display screen. Thereby, based on prior input information, the input display unit displays the coordinate system determined by the physical variables and their units to be imaged from the set-value graph, where according to displayed coordination variables, certain functional values, for example, temperature and time-determined process control

and/or adjustment set values can be displayed. By means of the light pen G, these functional values can be entered dot-by-dot.

For the input of set values into the set-value memory S for process and/or adjustment control, only the corner dots E of a desired set value graph K have to be entered by a light pen --schematically depicted in the diagram -- into the coordinate system as displayed by display unit B. The coordinates of these corner dots E are now received by the microprocessor R, which determines the interdots Z located between corner dots E, as shown in the diagram. Finally, the coordinates of these interdots Z, together with the coordinates of the entered corner dots E, entered by the light pen G, are stored as set values in set-value memory S.

From the beginning of the process to be controlled and/or adjusted, the set values can be released in proper sequence at the output point s of the set-value memory S, regardless of whether they were entered by a light pen G or whether they were determined by microprocessor R. This will not be discussed any further at this point.

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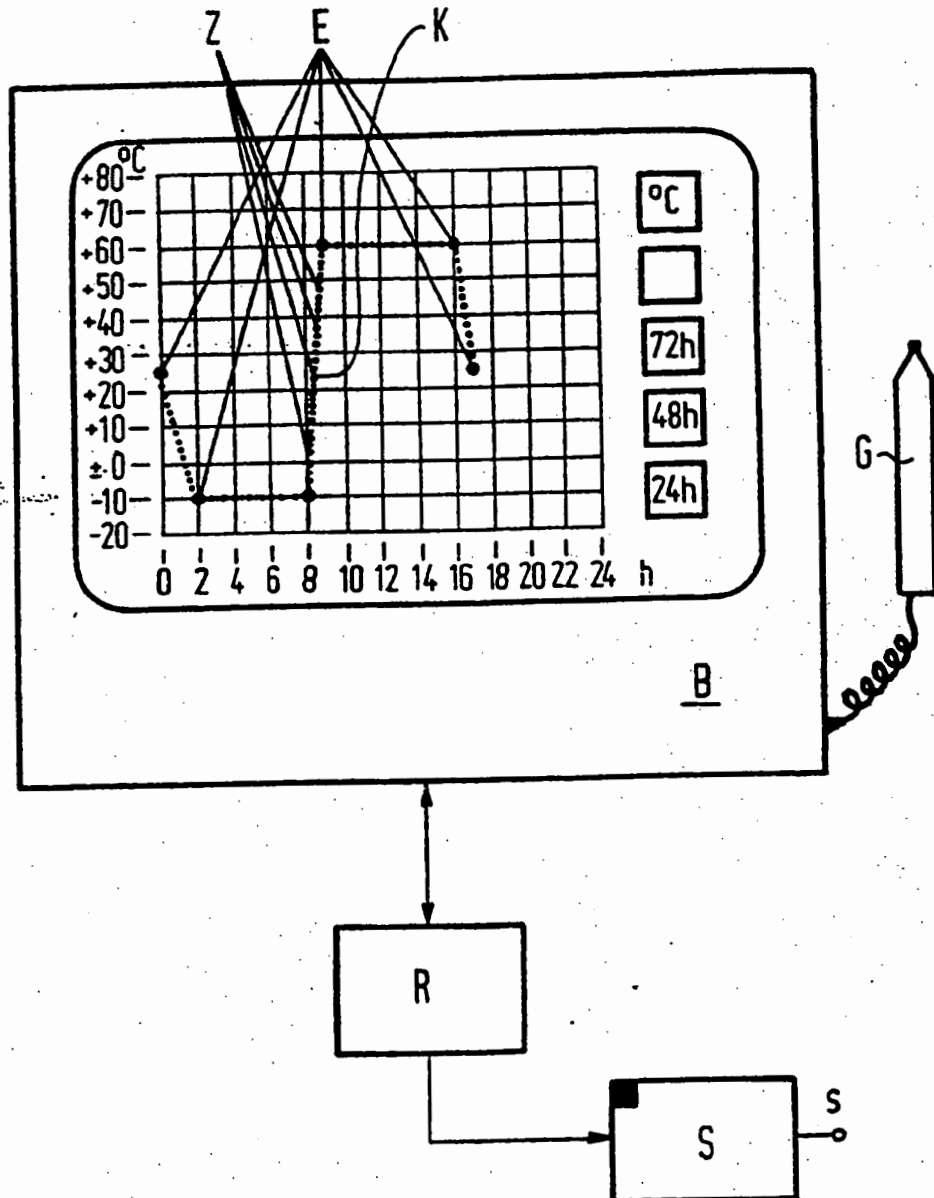
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(72) Inventors:  
-- **Copley, Jonathan Miles**  
**6330 Cham (Switzerland)**  
-- **Hauser, Thomas**  
**6330 Cham (Switzerland)**

(71) Applicant:  
**Electrowatt Technology Innovation AG**  
**6301 Zug (Switzerland)**

**(54) Procedure and Device for Input of Process Parameters**

(57) This invention describes a procedure and a device for input of process parameters, specifically a heating/air conditioning system or components related thereto, whereby on an input device (1) of a control unit (2) of a heating/air conditioning system or, for example, a room-temperature control unit, different process states and/or the parameters (14, 16) to be adjusted accordingly by means of variable indicator/control fields (7,...7f) and, if applicable, in conjunction with fixed indicator/control fields (10, 12), are displayed. By selecting different control levels (23a, ...23e) the respective process parameters (14, 16) can be entered for each selected control level, causing different

indicator/control fields to appear. The design of these indicator/control levels (7,...7f) is variable, i.e., they function either as an indicator or control field for each control level, or assume no specific task, each time varying in their function, their significance, and their dimensions. Thus, the operator is guided, according to each control level (23a, ...23e), by indicator/control areas of different design, emerging in different positions of the input device (1) in different dimensions and with different functions; thereby, intuitive user guidance is guaranteed.

**FIG. 1**

## Description

[0001] This invention pertains to a procedure for the input of process parameters, specifically of a heating and/or air conditioning system, as claimed in claim 1, an input device of a control unit for the input of process parameters and use of this procedure and the input device for programming a heating/air conditioning control unit, a thermostat, or an air conditioning control unit as claimed in any of claims 14 thru 16.

[0002] Such procedures and devices for different purposes and applications are already known. For example, EP 0 831 276 A1 lists a known input device for the control of kitchen stoves, displaying a so-called "touch-screen", which displays different indicator/control areas of different operating modes of a stove in connection with fixed indicator/control fields; these areas also serve as controls for individual burners on top of stove ranges.

[0003] In addition, computers placed in airports and banks are known to be equipped with such touch-sensitive input areas, for the purpose of facilitating the operator's data input by enabling him to avoid using a keyboard or mouse. Such touch-sensitive input-masks are known from WO 93 11 518 A1 and consist of two transparent flexible plastic sheets/films equipped with almost invisible electrodes in-between, on touch creating an electric contact, thereby communicating the touch position, i.e., the operator's "request", to the control unit and control device, enabling it to compare the touch position with the respective underlying function, thereby performing the requested task.

[0004] By contrast, control systems in buildings are far more complex. Even in a simple private home, a heating system consists of a different number of components, e.g., a burner, a pump, different valves, thermostats for the different rooms, and, as a possible addition, an air conditioning system, all of which must be regulated and controlled and perform different functions, depending on the heating program. This requires, for example, for the heating system to provide different temperatures at different times of the day or for different days of the week or during vacation days.

[0005] Present-day "intelligent" building control systems include control of furnace, air conditioning, security systems, fire detection equipment and additional systems to maintain a building, adding more

and more to an increased complexity in this sector as well. In order to reliably regulate and control such systems, the current owner, in most cases, needs to study very complicated and voluminous operating manuals.

[0006] In addition, the problem of adjusting the respective control parameters and process parameters within a building control system consists in that in many cases the user only rarely changes the adjustment of the respective process parameter – perhaps in summer or winter – so that, unlike the operation of computers or kitchen appliances, he no longer remembers the operating instructions about the control device.

[0007] Traditional control devices for the adjustment of, say, heating/air conditioning systems of a building are mostly of a very complex design, because the different multitude of process parameters must be entered for a multitude of different process conditions. For the most part, programming errors occurring in these traditional heat-control units are not immediately detected, and during the course of days, weeks or even months of this error-state prevailing in the system may cause lasting defects to or even ruin individual appliances, heating units, or system facilities. In addition, strict guidelines issued by the Technical Inspection Agency [TÜV] and relevant licensing bureaus for approval and initial operation of such heat control units, require their "fail safe" design. In this instance, too, there exists a fundamental difference between these extremely complicated heat control units and the very easy operation of kitchen appliances, fax machines, copiers, or bank-transfer computers.

[0008] The above-mentioned factors – significant complexity of heating units, complicated instructions to be absorbed by operators, lengthy intervals between operations of these devices and the inherent potential of severe or even ruinous consequences to a building, caused by a maloperation of these heating control units – for some time have led to a demand for an easily operated and intuitive user system for the input of process parameters relating to heat control units.

[0009] EP 0 332 957 informs us about a heat control unit with an, inter alia, multifunctional display provided with set as well as variable input fields. Applicable keyboards are strictly allocated to definite operating modes,

with this heat control unit showing one line of variable keyboards, which, according to the selected operating level, are suitable for controlling different process parameters. To these keys – arranged in a set location of the input field – can be selectively allocated different functions in menu form. The disadvantage of this heat control unit lies in the complexity of inputting the appropriate process parameters as well, demanding of operators a high degree of knowledge about programming these heat control devices, as on one hand these keyboards are always positioned in a fixed location, on the other hand their dimensions are unchangeable, forcing operators to advance to different operating levels by frequent and repeated pressing down on different keys. However, these operating levels are of a very complicated design and, because of the keys being almost constantly occupied, understanding their application remains limited. The variable keys are also programmed with constantly recurrent references, their dimensions remaining unchanged.

[0010] Therefore, the underlying task of this invention is to improve input procedures and devices of heating/air conditioning systems of the type mentioned in the beginning, so as to avoid the disadvantages of conventional procedures and devices and, specifically, to make it possible for operators to intuitively program the control unit of a heating/air conditioning system or any of its components, without prior knowledge and without having to study lengthy and complicated operating instructions.

[0011] The task of this invention will be solved by means of independent claims 1 and 7. Further developments are claimed in each sub-claim: Several applications of the procedure according to the invention and the input device according to the invention are claimed in claims 14-16.

[0012] This invention describes a procedure for the input of process parameters, specifically a heating/air conditioning system or components connected thereto, where different process conditions and/or the corresponding process parameters to be adjusted are shown on an input device of a control unit of the heating/air conditioning system or, as an example, of a control unit regulating the room temperature of a certain room or air conditioning several rooms of a building, by means of variable display/operating areas and, if applicable, in connection with set display/operation areas. By selecting different control levels, each process parameter can be entered, causing various display/operation areas to appear. These display/operation areas are designed to be variable in such a way that they either function as a display or an operating area for each control level or perceive no specific task but time vary in their functions, their reference, and their dimension, where according to the

operation level, the operator is guided by differently designed display/operation areas emerging at different positions of the input device in varying dimensions and with varying functions.

[0013] By means of simple, intuitively self-explanatory symbols the user moves "hand over hand" through the operational levels by pressing menu-recreated on the corresponding operating panels which by the display of different operational fields at different positions and with different dimensions guide the user step-by step through the programming process of the heat control unit.

[0014] Selection of different operation levels can proceed in different ways: One, it is possible to select the different operational levels by means of certain display/operation areas. As soon as a certain operational panel is activated, parts or the entire input area will change; new operation/display areas of different dimensions and functions will appear, thereby pointing out to the operator in a simple way which process parameters he about to adjust and which process condition and/or process parameter happens to apply at the moment.

[0015] Another possibility would be to equip the input field of the input device with different insert cards, so that according to the inserted card the respective operating areas of the input field would display different functions, meanings, and dimensions. The insert cards then define the different operating levels, the functions of the input device, and the image and selection of at least parts of the display/operation areas. The insert cards may be designed as magnetic, mechanical, electronic, or optical data carriers in the format of a credit or telephone card, having either a magnetic strip, an electronic chip or a perforated area in order to communicate to the input device which function is supposed to be set or which function the input device is to perform. The input device is capable of communicating with the corresponding insert card.

[0016] By means of these insert cards, which on the input device correspond partly or completely with the respective LED, LCD, or set indicators, visually replacing, supplementing, functionally adjusting, optimizing and/or parameterizing them, the service specialist or user of the system to be adjusted is able to quickly and cost-effectively program and adjust the input device. The system-specific parameter are transferred in situ by inserting the card and provided with a systems diagram and key allocation. By inserting the card,

the device is then parameterized, controlled, and optimized. This combination of insert card, variable display/operation fields, and their automatic allocation substantially reduces time spent by service personnel in situ, as well as maintenance, installation and reprogramming costs.

[0017] Another possibility consists in letting the input field connected – detachably – with the input device, slide across a surface, which clearly shows all procedural conditions and process parameters of the procedure to be controlled, in order to adjust the respective process parameter. The different positions of the input represent the different levels of operation which, in the case of insert cards or activation of different operation levels by individual operation areas represent individual levels of operation by means of display/operation areas.

[0018] In this process, the variable display/ operation areas will select only the part of the process that is selected by the respective control level and is needed at the moment for the adjustment of the corresponding process parameter, thereby avoiding an inundation of operators with excessive and confusing information.

[0019] As an advantage, the process parameters relevant in each case are changed during the input of process parameters by corresponding indicator/operating fields, so as to allow the operator to maintain control over his current activity at all times. Thus, at input of the respective values, the dynamic change of the relevant process parameters facilitates "the programming of the control unit in a playful way". This offers a variety of graphic possibilities to facilitate the input of different process parameters for operator. Furthermore, this provides the possibility of programming different controllers by the same input device, i.e., the possibility of using a portable input device that will be attached to the respective controller that then can be programmed via the above-mentioned control levels. This will drastically reduce the cost of input devices for controllers of heating/air conditioning systems or their related components. Furthermore, adjustment of the many different components of the heating/air conditioning system will be made easier for the user by the fact that he always deals with the same menu management and the same symbols and images of process parameters, making it possible for him to use the same input device to perform a great variety of programming functions, regardless of room temperature adjustments, adjustment of the central heating kettle, or adjustment of air conditioning for different rooms.

[0020] The input area is a touch-sensitive and transparent field, realizing the vastly different

operational fields in known ways by means of a transparent and/or semi-permeable touch-screen element. These transparent elements are familiar and available on the market in large quantities.

Therefore attaching the detachable input field to the input device and to provide for appropriate means of communication so as to be detachable appears to be advantageous, in order to make communication between input field and input device possible. This communication may proceed either wire-bound, radio-controlled, or by optic means, thereby, for example, enabling operators to program different controllers inside a house by means of a portable input area.

[0021] For instance, placing certain surfaces, backed by symbols, on or adjacent to respective controllers, so that the input area merely has to be placed on top of the surface for appropriate programming, would be an option. The appropriate position of the input area on the surface would then be determined mechanically or electromagnetically or optically. Similar to the computer "mice", the input area can be moved across the surface, where, depending upon the position on the surface different functions, dimensions, or meanings are allocated to individual indicator-/operation areas. Another possibility would be to combine this input area with an LED-indicator that can be co-integrated into the input area and, furthermore, could be of transparent design as well, so that, according to the selected function, and/or according to the process parameters to be adjusted, the relevant process parameters is shown on the input area itself, next to the subjacent surface, changing dynamically upon input of the appropriate data.

[0022] Furthermore, the input device may itself have an opening to receive insert cards that define the different operation levels and are provided with a perforated grid, to enable the input device to identify the type of insert card used. As an option, the insert card may be provided with a magnetic strip, indicating to the input device which card is inserted at the moment, whereupon the input device communicates to the input area which indicator/operation areas are activated, their function and meaning, the dimensions to be shown and, if applicable, the LED-readings to be activated. These LED-readings can also be deposited with parts of the input area, so that the respective indicator/operation areas of the input area indicate no function at this point.

[0023] In this way, the greatly different dimensions of operation areas and/or display areas can be defined – either having a display or operation function or merely acting as non-functioning "glass" for the display of subjacent LED-readings, surface, symbols, or graphic images.

The combination of display/operation areas is designed in a way that, according to the selected operation level, individual areas either serve for displays or operations or for display plus operation or, in addition, to cover up or display subjacent surfaces. Furthermore, colored plastic or paper cards can be inserted between LCD/LED-reading and/or the display/operation surface and the touch-sensitive element, i.e., touch-screen input area, to cover parts of the subjacent display area, for the purpose of realizing specific input/display options. This allows to emphasize particular elements, e.g., time periods of temperature decreases and time periods of heating intervals, highlighted in part by color-coded cards and in part by the subjacent reading "display" or by lighting up, to communicate to the user that this particular area is currently either activated or deactivated. This is illustrated by:

- Fig. 1 Schematic view of a heating/air conditioning system with input device, according to the invention, and enlarged view of the input area;
- Fig. 2 input device and sectional view of the input device;
- Fig. 2a a different design of the input device, according to Fig. 2;
- Fig. 2b an additional design of the input device according to Fig. 2;
- Fig. 3 an additional design of the input device, according to Fig. 2 and sectional view of input device;
- Fig. 4 view of a first operation level of the input device;
- Fig. 5 view of two second operation levels;
- Fig. 6a view of a third operation level;
- Fig. 6b view of a fourth operation level;
- Fig. 6c view of a fifth operation level;
- Fig. 7 view of an additional fifth operation level;
- Fig. 8 view of a variation of the operation level, according to Fig. 7;
- Fig. 9 view of a dynamic 5<sup>th</sup> operation level with an appertaining 6<sup>th</sup> operation level; and
- Fig. 10 schematic view of a very large number of two-dimensional operation levels, arranged

side by side.

[0025] Fig. 1 shows a schematic view of a controller 2, for example of a heating/air conditioning system with flow 3b, return 3a, and pump 4. Likewise, controller 2 may involve the thermostat of a warm-water pipe 3a and 3b, connected with one or several heating units (not shown) via a stop valve 4 which is connected with room-temperature sensors (not shown) which reads the current room temperature and provides it to controller 2, thereby enabling it to control the warm-water pipe of the heating unit in accordance with adjusted temperatures during different hours of the day.

[0026] The heat controller 2 is connected to an input device 1 which a data line 5 (in case it is placed at a distance from controller 2) or which may be attached directly to the controller 2. The input device shows an input area 6, enlarged for emphasis in Fig. 1 emphasis. This input device 6 is equipped with display/operation areas 7, shown schematically in Fig. 1 as an arrangement of cells and columns.

[0027] Fig. 2 shows a view of the input device 1 with input area 6 which is fastened on top of the input device 1. Input area 6 shows a number of display/operation areas 7, arranged besides fastened display/operation areas 10. The right half of input area 6 is used to indicate e.g., room temperatures varying between 5° C and 30° C, the actual current temperature being indicated by one or more light-emitting diodes 8. The section through input device 1 also shows the display/operation areas 7 arranged at the left side and the etiquettes and adhesive labels 10 fastened for temperature readings, arranged next to each diode 8. This section of input area 6 can also be transparent, in order to make the markings underneath the display area 6 visible. By example, current temperatures can also be realized by means of digital readouts. Underneath the variable display/operation areas 7, a hollow space is provided for receiving insert cards 9, which are provided with appropriate means for the input device 1 to recognize the type of card that has been inserted into opening 11.

According to the type of card 9 inserted into the opening, the display/operation areas 7 are assigned different functions, meanings, and/or dimensions, so that either individual display/operation areas 7 have individual functions or a group of display/operation areas 7 are combined to perform one function or display.

[0028] Fig. 2a shows a different design of input device 1 according to Fig. 2, having input area 6 attached atop input device 1. Again, cards 9 are used to be inserted into opening 11; these insert cards 9 are smaller than those used in Fig. 2, so that the lower half of input area 6 is used as fixed display/operating area 7a. This display/operation area 7a can be provided either with different functions and/or references by the input device 1, by means of a subjacent active surface for the display of process parameters or be used

strictly for the display of process parameters which can be changed via variable display/operation areas 7 in the upper left part of input area 6. Here, too, the right half of input area 5 is used for temperature readouts, displayed by etiquettes or adhesive stickers 10, their active status being displayed by light-emitting diodes.

[0029] Fig. 2b shows a further design of input device 1, according to Fig. 2 or Fig. 2a, where, as an additional feature the right, previously static input area 6 has been replaced by two oblong variable display/operation areas 7f, which can be used e.g., for the display of relevant process parameters or for the input of additional functions. As an example, when inserting a card 9 into the upper left part of input area 6 one could conceivably provide the respective operation areas 7 with their respective functions, while a larger display area 7a at the left lower part of operation area 6 is activated to indicate the process status to be actually adjusted, whereas the small static display area at the right lower edge of the input area 6 can be intended as an warning area in a situation where the room temperature drops, say to 5° Celsius. If the temperature exceeds 5° C, both right oblong areas 7f of input area 6 can be used to read the current temperature and in addition be used to show date and hour.

[0030] Fig. 3 shows yet another design of input area 6 according to Fig. 2, Fig. 2a or Fig. 2b. In this version the right lower half of display area 6 is intended as fixed display/operation area 12, to be equipped either with switches, buttons, or keys, whereas the other parts of input field 6 are provided with variable display/operation areas 7.

[0031] By example, Fig. 4 shows a first operation level 23a of operation area 6, subdivided into two upper rows of six each variable display/operation areas 7b and to lower fixed display areas 7c. The upper left variable display/operation area 7b shows the current hour, where pressing down on the operation area changes the entire input area 6 and, e.g., a second operation level 23b according to Fig. 3 (at the left side) appears, containing only 4 areas. At the left side, display area 7a can be seen, showing the actual hour, in this case "09:45". By pressing down both upper right control keys (operation area) 7b, the time can be adjusted, while the lower-most right control key 13b is used to reset into the first operation level 23a, according to Fig. 4.

[0032] By pressing down on the upper central display/operation area 7b, according to Fig. 4, the second operation level 23b, depicted in Fig. 5, is reset, which, like the second operation level 23b can be used to adjust the time. The current day-temperature, in this example 23° C, is shown at the left side, while the current day-temperature (e.g., the room-temperature) can be adjusted by both upper right keys 13. By pressing down on the lower right operation area 7b, the return key 13b retrieves the

screen, i.e., i.e. into the first operation level 23a, according to Fig. 4.

[0033] The same procedure applies to the upper right display/operation area 7b for adjustment of the respective night temperature. The adjustment of thermostats for the entire day is located below the upper three display/operation areas 7b according to Fig. 4. On the lower two rows of input area 6, one recognizes display areas 7c, which show the different hours as well as the date 21, i.e., always the current date. The rectangular curve shows the adjusted room temperatures at different times of day, and point 17 displays the current hour – also displayed in the upper left display area 7b.

[0034] Fig. 6a shows a third operation level 23c, accessible by clicking the return keys 13, according to Fig. 5, as long as this procedure is provided for. There, the days of the week are displayed by means of different large display/operation areas 7d. The display of current weekdays 14 is used for the adjustment of different heating graphs for each day of the week; a "copy" key activates the installed copy function. The "return" key 13b is used to "jump" back to the first operation level 23a. However, it is also possible to jump into operation level 23c, depicted in Fig. 6a by clicking the above-described keys of the first operation level 23a, so that clicking the respective days of the week results in jumping into the respective second operation level 23b, shown in Fig. 5, in order to input the desired temperatures for different times and different conditions of the day.

[0035] Fig. 6b shows a fourth operation level, characterized by the capability to intuitively adjust the rectangular curve shown in Fig. 4 by defining the different time periods t1 to t6. the upper two rows of display/operation areas 7e are used to adjust the time periods t1 to t6 as well as time as such, i.e., the adjusted current time for the respective time period – the time changing dynamically by clicking the arrow keys. In these areas, indication of the individual time periods t1 to t6 is static. Thereby the first two rows of display/control keys 7e meet the demands of display areas, of operation areas, and of set display/operation areas.

[0036] The lower two rows of display/operation areas 7e are used for dynamic display of the current, adjusted process parameters t1 to t6, as well as for a readout of the respective day- and night-temperatures, adjustable by the left lower four display/operation areas. Again, arrow keys 13 are used to adjust the displayed temperature 14. When changed, i.e. the relevant arrow key 13 is clicked, the upper and/or potential of the heating graph 16a and 16b changes.

[0037] Fig. 6c shows another design of the fourth operation level 23b, defining different on- off stages for different times of different heating periods as well, using display/operation areas 7b, activated accordingly by touch, indicating to the operator by the light of an individual operation area 1, that now the time within the operation field can be changed by clicking

arrow-key 13. Clicking the return key 13b resets the third operation level 23c.

[0038] Fig. 7 shows another design of input area 6, having a large display field 7a, which is changed via operation fields 7b and its arrow-symbols 13. On the left lower display area 15 the symbol for the relevant day-period is located, in this diagram, for example, the daily activity. By clicking both upper left arrow-keys the relevant daytime temperature (here, 24° C) can be enlarged or reduced, while with both lower right arrow-keys 13 the on/of time for this daytime temperature can be altered. During this process, a ball 17 moves slowly along the rectangular graph, so that, depending on the position of the ball, either both upper left control keys 7b or both lower right control keys are activated, enabling the operator to adjust the correct time as well as the correct temperature.

[0039] Fig. 8 shows another design of the fourth operation level 23d of Fig. 7, which, instead of a rectangular curve as in Fig. 7, is provided with a coordinate system, whose horizontal axis indicates the current temperature and the vertical axis – the correct time. By using the relevant arrow-keys, the currently adjusted variable 16 can be altered so as to adjust the respective temperature for the corresponding time period or time to achieve the selected process status 15. Even this instance clearly shows that only a few of the variable display/operation keys are intended for operation, whereas other display/operation keys 7 are used for display or are meaningless.

[0040] Fig. 9 displays another adjustment option of the fourth operation level 23b, also including a fifth operation level 23a. Clicking the left lower two arrow-keys 13 of the fourth operation level 23d, allows point 17 to move dynamically along rectangular graph 16, while an indicator simultaneously shows the position of point 17 on the curve. The upper large display area 7a operates only for dynamic display of the of the changing process parameter that can be changed by means of the two lower arrow-keys. By clicking the relevant return-key 13b the actual daytime and nighttime temperature for the selected time 14 in the sixth operation level 23e, with the operation area 7a of the sixth operation level 23e automatically indicating the relevant night or day-symbol, depending on the time 14 the return-key 13b has been clicked in the fifth operation level 23d. By clicking the return-key 13b of the sixth operation level 23e, a jump back into the fifth operation level is possible. Inside the fifth operation level 23d another area (not shown) can be provided, guaranteeing a return jump into the first Operation level 23a, shown in Fig. 4.

[0041] Fig. 10 shows an alternative design of this invention, having an input device connected by a line with a transparent input area 6.

[0042] This input area 6 can be moved across the surface 30 backed by symbols. The surface is provided with means for detecting the position of

input area 6. In addition, input area 6 can itself be equipped with such means, in order to communicate its current position to input device 1. This can be realized by moving input area 6 into a reset position by clicking a certain key on input area 6, to communicate to input device 1 that input area 6 is currently placed on reset.

[0043] All relative moves of input area 6 can be detected by optic or mechanic means (e.g. small balls on the underside of the frame of input area 6). Depending on the adjusted position of input area 6 on surface 30, the applicable display/operation areas 7 of input area 6 are defined by appropriate functions, references and/or dimensions, so as to enable input device 1 to assign different tasks to relevant display/operation areas 7, depending upon the position. The surface 30 is provided with symbols 7, 14, 13 of different type and size and can also be provided with a surface 12 for operator's information; it performs no technical function. Here, too, input area 6 can be provided with combined display/operation areas, which can cover parts of the surface below or overwrite them with other displays, thereby potentially achieving utmost flexibility.

[0044] This arrangement is of particular advantage, as operators have a clear view on surface 30 of each function and all process parameters and process states. Depending on their planned use, "controllers" or "process parameters to be adjusted", different adjustments of applicable display/operation areas can be defined.

#### Patent claims

1. Procedure for input of process parameters, specifically a heating/air conditioning system or related components,

by displaying on an input device 1 of a controller 2 different process conditions and/or the relevant process parameters (14, 16) by means of display/operation areas (7, ... 7f) and possibly in conjunction with fixed display/operation areas, and to select different operation levels (23a, ... 23e) for input of process parameters (14, 16) via different display/operation areas (7, ... 7f, 13), characterized by

the input of process parameters (14, 16) via variable display/operation changing their function, reference and/or size according to the selected operation level (23a, ... 23e), where the variable display/operation areas (7, ... 7f) are located, at least in part, in varying positions.

2. Procedure as claimed in claim 1, characterized by

selection of the different operation levels (23a, ... 23e) by means of certain display/operation areas (20, 13b) and/or by means of insert cards (9), and/or by means of Input area 6 of input device 1 and underlying surfaces or parts of a surface (30).

3. Procedure as claimed in claim 1 or 2, characterized by

selection of process parameters (14, 16) via variable display/operation areas (7, ... 7f) which reproduce only the part of the process selected by the applicable operation levels (23a, ... 23e).

4. Procedure as claimed in one of the aforementioned claims, characterized by

providing the insert cards (9) with information for the selection of variable operation levels (23a, ... 23e).

5. Procedure as claimed in one of the aforementioned claims, characterized by

the input of process parameters (14, 16) over variable display/operation areas (7, ... f), which according to values entered, undergo a dynamic change and/or indicate a different operation level (23a, ... 23e)

6. Procedure as claimed in one of the aforementioned claims, characterized by

graphic representation of process parameters (14, 16) i.e., temperatures, weekdays, heating curves, heating periods or combination of process parameters (14, 16), this graphic representation undergoing at least partial changes during input of process parameters (14, 16)

7. Procedure as claimed in one of the aforementioned claims, characterized by

detecting variable operation levels (23a, ... 23e) and allocating variable display/operation area (7, ... 7f) to input area (6) or to parts of input

area 6 of the input device (1), according to their function, reference and/or their size.

8. Input device (1) of a controller (2) for the input of process parameters, specifically a heating/air conditioning system or related components, with variable display/operation areas (7, ... 7f) and, possibly, fixed display/operation areas (10, 12) indicating different process conditions and/or process parameters (14, 16) to be adjusted, and can be input into various operation levels (23a, ... 23e), via process parameters (14, 16), via varying display/operation areas (7, ... 7f, 13),

characterized by

the input capability of process parameters (14, 16) via display/operation areas (7, ... 7f) which, according to the selected operation level (23a, ... 23e) alter their function, meaning and/or size, and the fact that the variable display/operation areas (7, ... 7f) for varying operation levels (23a, ... 23e) occupy varying position, at least in part.

9. Input Device (1) as claimed in claim 8, characterized by

input device (1) having a touch-sensitive and transparent input area (5) that has varying operation areas (7, ... 7f), detect touch and relay it to the input device (1), as well as making visible any surfaces, data, or objects located below the input area (6).

10. Input device (1) claimed in claims 8 or 9, characterized by

the fact that the input area (6) is detachably connected to input device (1) and has means for data communication with input device (1)

11. Input Device (1) as claimed in one of claims 8 - 10

characterized by

input device (1) having an opening to receive insert cards (9), defining the different operation levels (23a, ... 23e), as well as having means for the detection of the insert card (9) used in each case.

12. Input Device (1) as claimed in one of claims 8 - 11,

characterized by

the defining by insert cards (9) of different operation levels a...23e), functions of the input device (1), and display & selection of at least

parts of display/operation area (7,...7f).

13. Input Device (1) as claimed in claim 11 or 12 characterized by

the insert cards (9) being magnetic, mechanical, electronic, or optical data carriers and the input device being capable of communicating with the appropriate insert card (9).

14. Input Device (1) as claimed in one of claims 8 – 13, characterized by

the input device (1) and/or the input area (6) having a muffle for the detection of the position of the input area (6) on a surface (30), with the varying positions of the input area (6) on the surface (30), defining the varying operation levels (23a,...2e)

15. Input device (1) as claimed in one of claims 8 – 14, characterized by

the activation or deactivation of individual operation areas (7, ...7f) of the input area (6), according to the selected or detected operation level (23a,... 23e).

16. Input Device (1) as claimed in one of claims 8 – 15, characterized by

the added usability of individual operation levels (7, ...7f) of input area (6) for the display of process parameters (14, 16) and/or process conditions.

17. Use of an input device (1) as claimed in one of claims 8 – 16, or a procedure as claimed in one of claims 1 – 7 for programming the heat controller of a heating system.

18. Use of an input device (1) as claimed in one of claims 8 – 16 or a procedure as claimed in one of claims 1 – 7 for programming a thermostat for the adjustment of the room-temperature of a room heated by a heating system and/or cooled by an air conditioning system.

19. Use of an input device (1) as claimed in one of claims 8 – 16 or a procedure as claimed in one of claims 1 – 7 for programming a heat controller for either individual or all rooms of a building.

Fig. 1

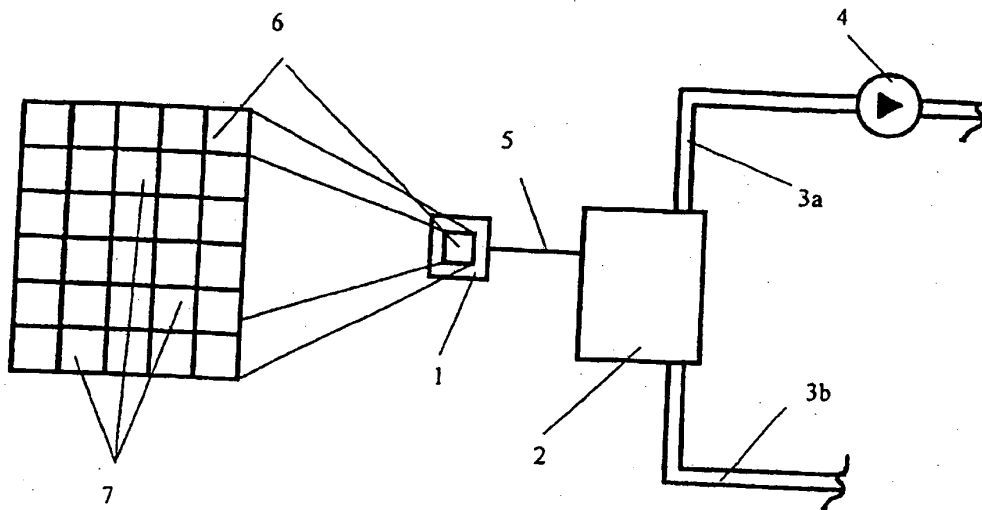


Fig. 2

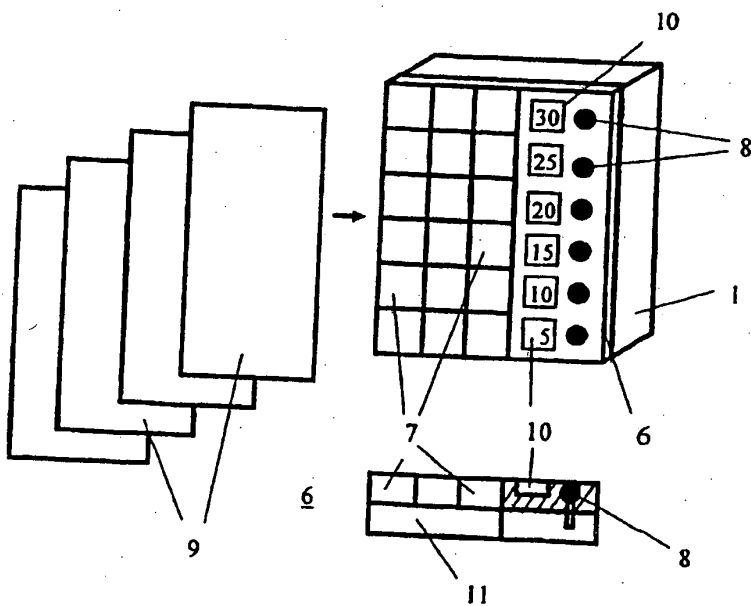


**Fig. 2a**

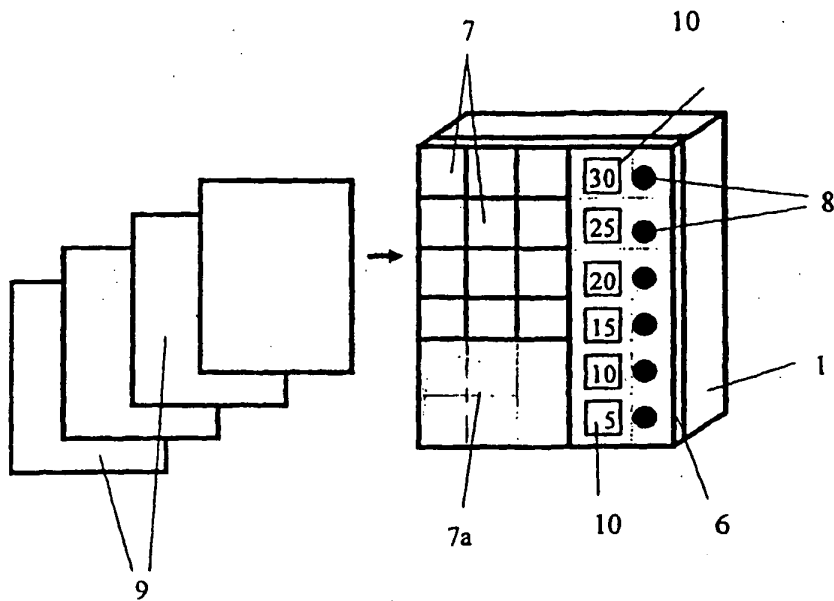


**Fig. 2b**

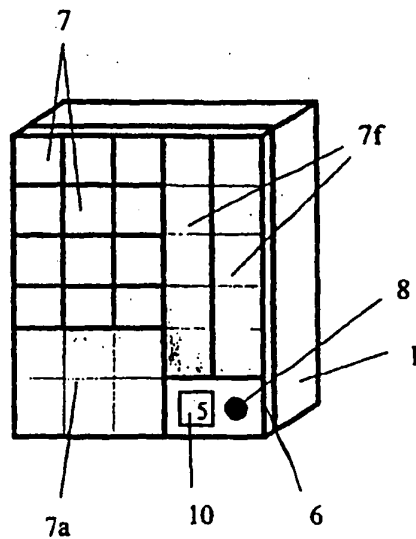


Fig. 3

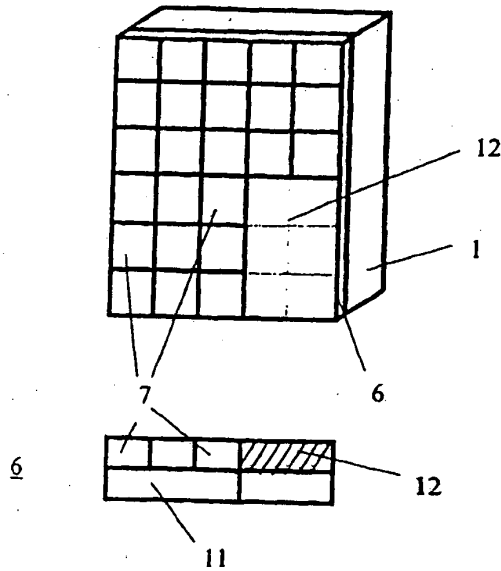
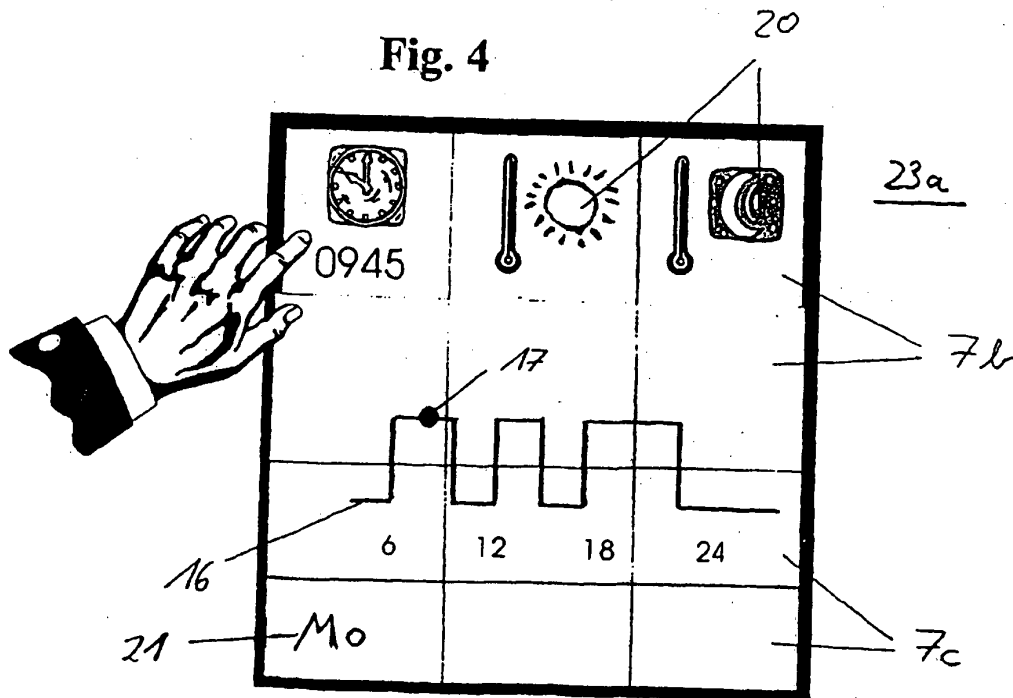


Fig. 4



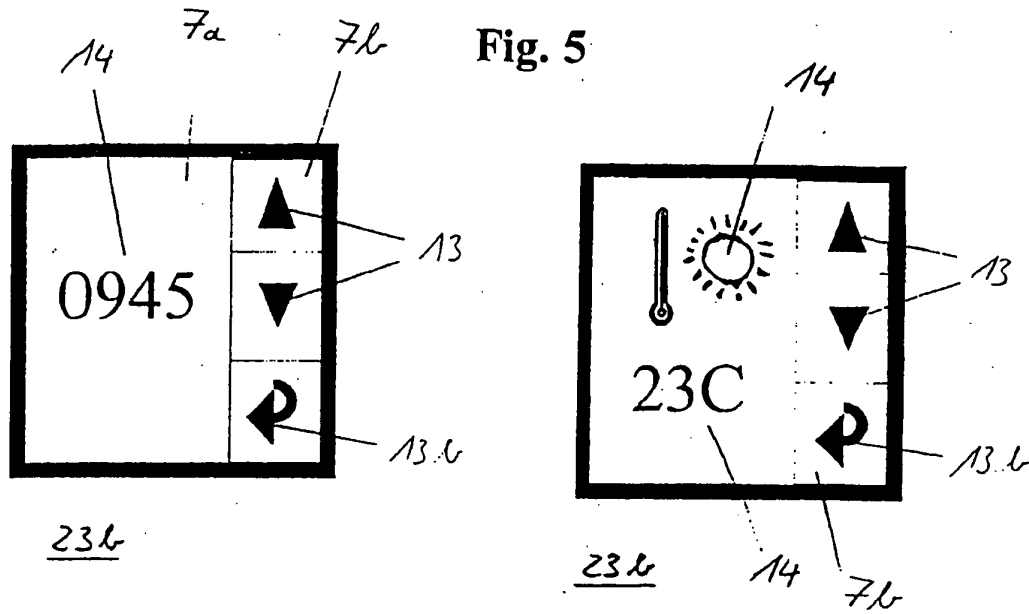


**Fig. 6a**

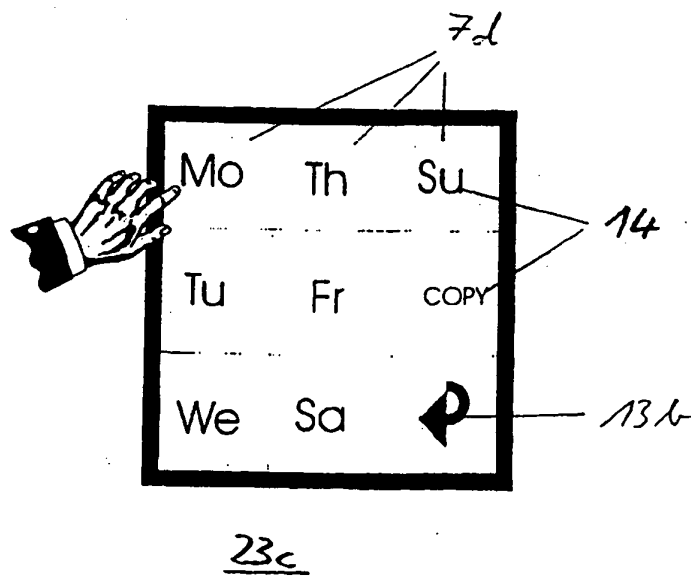


Fig. 6b

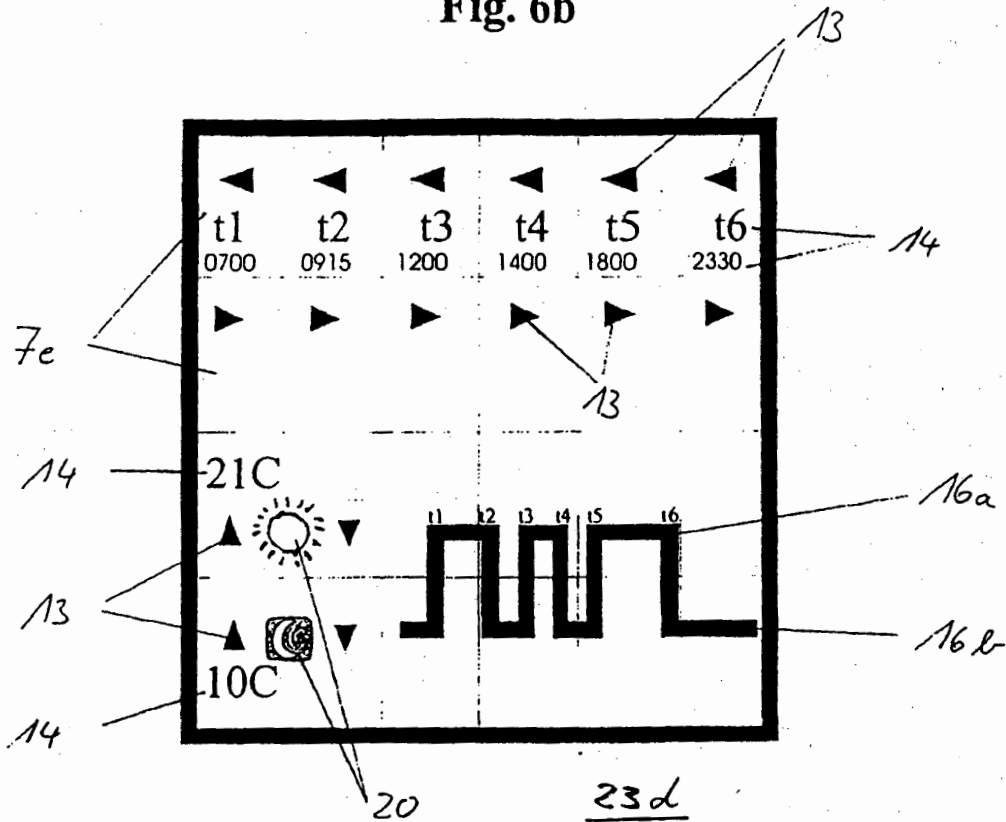


Fig. 6c

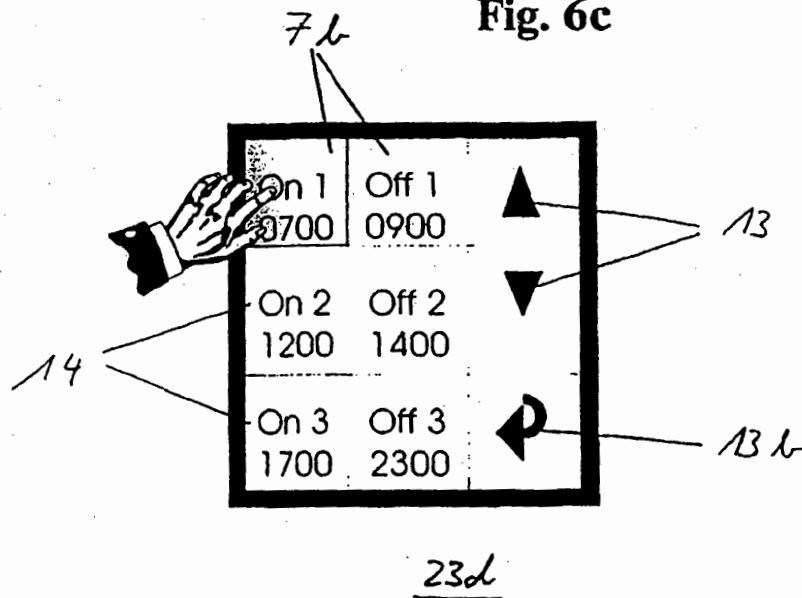


Fig. 7

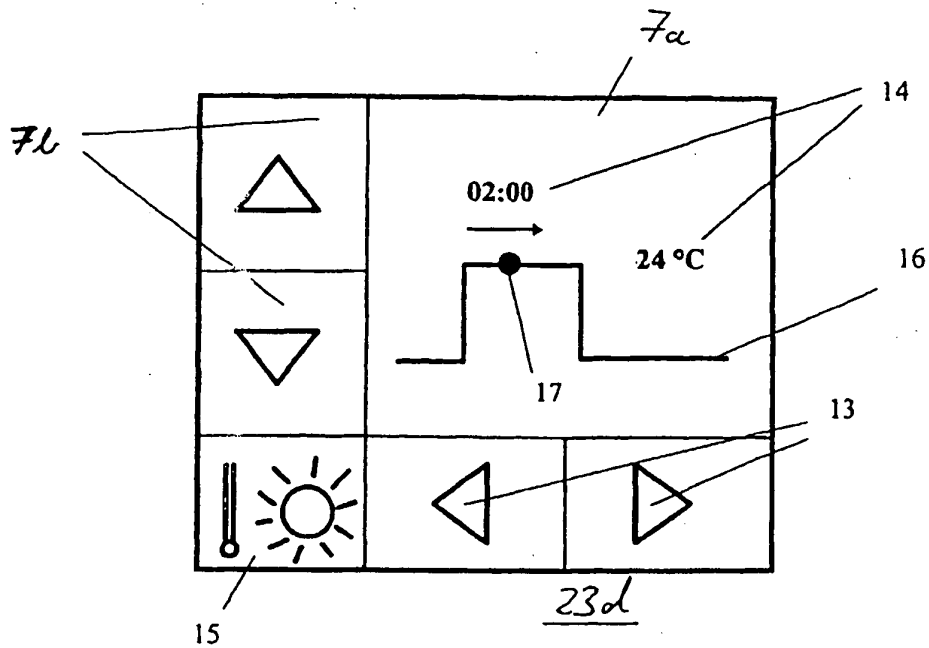


Fig. 8

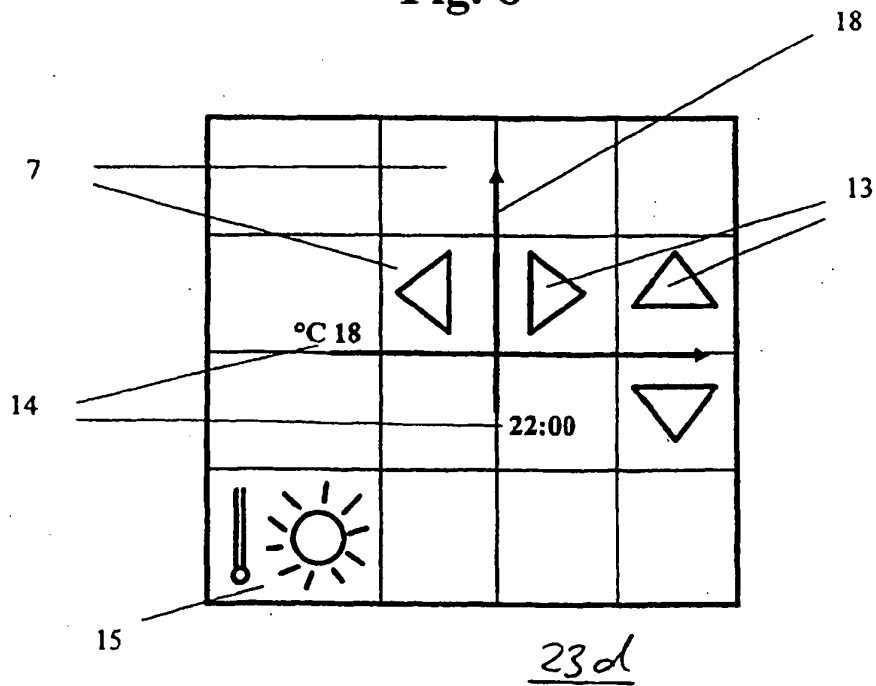
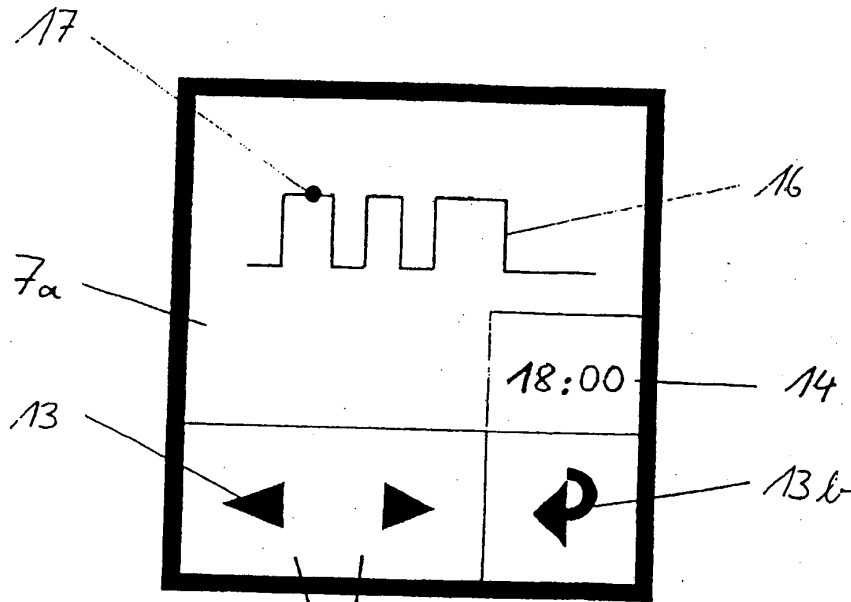
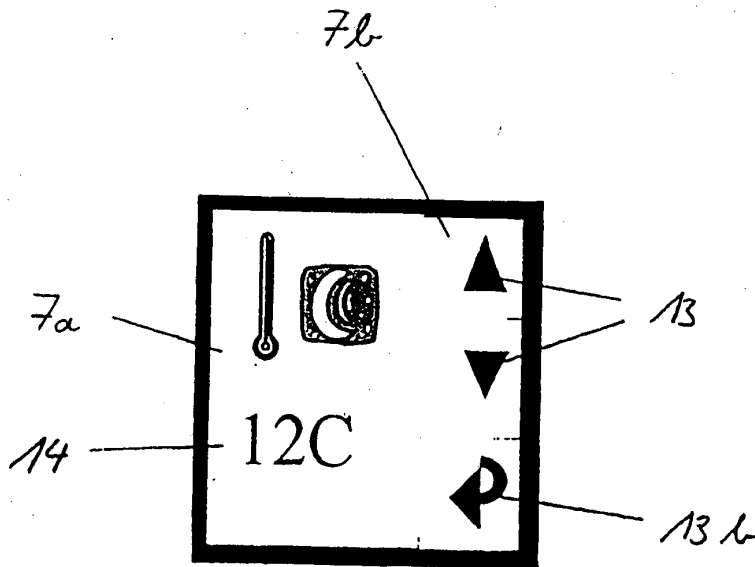


Fig. 9

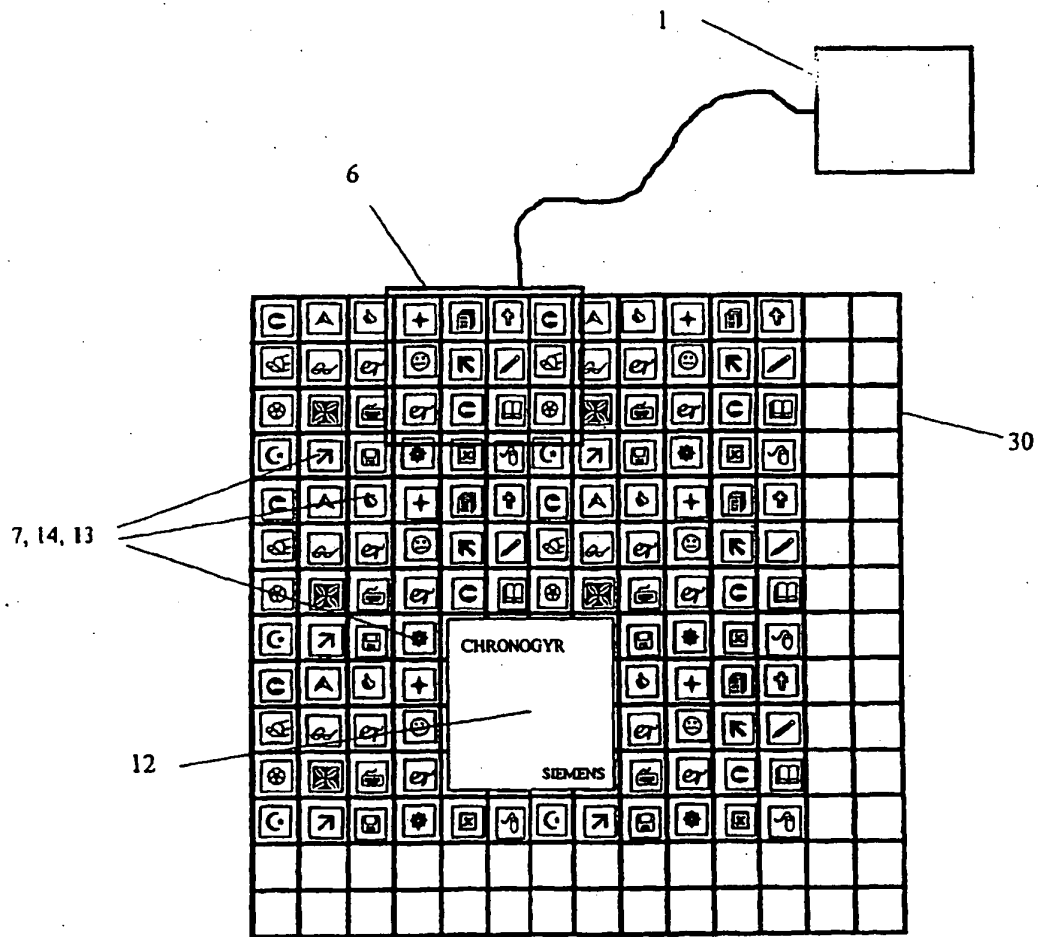


23d



23e

Fig. 10





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(71)(72) Applicant and Inventor: HANAZEDER, Erwin [AT/AT];

(74) Attorneys: HÜBSCHER, Gerhard etc.; Spittelwiese 7, A-4020  
Linz (AT).

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(54) Title: DEVICE FOR REGULATING A HEATING SYSTEM, SPECIFICALLY IN A RESIDENTIAL BUILDING

(57) Abstract

This invention describes a device for regulating a heating system, specifically for a residential building, with a heating controller (15), with an input device (17) for set temperature values related to a measured variable, preferably time and/or outdoor temperature, and with a set value memory (16) connected to the input device (17) transmitting set values, depending on the measured variable, to the heating controller (15). To simplify set value input, it is proposed that the input device (17) consist of a display (30) for analog screen input in at least one coordinate system with preset graduation and of an evaluation circuit (31) for set temperature values entered in analog form on the display (30) via the coordinate axis (34) for the measured variable, said evaluation circuit (31) being connected at the output side of the set value memory (16)

[DIAGRAM]

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TC2: 621148 v01 02/21/20

- 1 -

Device for Regulating a Heating System, Specifically in a Residential Building

This invention describes a device for regulating a heating system, specifically for a residential building, with a heating controller, with an input device for set temperature values related to a measurable variable – preferably time or external temperatures -- and with a set-value memory connected to an input device for transmitting set values, depending on the measured value, to the heating controller.

To control a heating system or individual heating circuits, according to a preset specified march of temperature, heating controllers are installed that compare the measured actual temperature values decisive for temperature control, e.g. outside temperature, inside temperature, flow temperature, etc., with preset values and intervene to offset any variance between preset and actual values. Specific temperatures in buildings, set for a day or a week, are usually programmed on a keyboard and set temperatures valid for selected daytimes must be entered and stored laboriously for each day of a week in prescribed sequence into a set-value memory allocated to the heating controller. This requires professional expertise. The graphic display of the stored set march of temperature via a time axis on the screen to facilitate the review of set values, has been known. However, the actual march of temperature as received by readings from temperature sensors in the heating system can be displayed on such a screen as well. After all, we are aware of the fact that to monitor a heating system, especially a solar heating system (EP 0676 682 A2), actual values perceived by temperature sensors and/or measured variables are stored in a time slot I case thresholds are exceeded prior to and after the are exceeded , in order to better assess any malfunction based on the stored temperature variables. However, while

- 2 -

these well-known procedures are structured on set values, they are unable to facilitate the required comparatively laborious input of set values.

Therefore, this invention is based on the task of designing a device of the kind described in the beginning that will simplify a set-value input, even for a layman.

The invention solves this task by means of an the input device which consists of a screen for analog input in at least one coordinate axis with preset graduation and an evaluation circuit connected to the output site of the set-value memory for analog input of set temperature values on display, via the coordinate axis.

This procedure creates the possibility for analog input of a set-value process into a coordinate axis on a display screen, provided with dimensional graduation.

By means the evaluation circuit, the set values required for regulation are determined from the set-value graph entered analog and entered and stored digitally into the set-value memory. The stored set values can be retrieved to be displayed again, to make any necessary corrections by analog overwrite of the displayed set-value graph. The changed set-value course is then stored in the set-value memory by means of the evaluation circuit.

The analog input on the screen could also be performed with a mouse connected to a computer. However, it would simplify matters if the screen were to be designed with liquid crystals covered by a touch-sensitive film, because the set-value graph could be entered by hand with a pen on this type screen, known as "touch-screen".

- 3 -

If additional input of certain program data related to a heating system is required for a program to proceed in an orderly manner, the screen can be provided with separate input areas for such preset program data to be transmitted to the heat controller. Screen input can be simplified via certain input areas, e.g., when set-value graphs are called up via these input areas for individual heating circuits or for certain weekdays.

If the set-value memory entered through the display screen is connected to a transmission unit at a distance between the input device and the heating controller, whose receiving unit is allocated to the heating controller, the preset-value transmission for heating control can proceed from a remote location over the transmission distance in an equally simple way via an analog screen input. To transmit data from the heating controller to the screen, it is recommended to equip both heating controller and input device with transmission and receiving units to traverse the transmission distance.

Of course, the display screen provided for analog input can be used for the display of selected measured variables of the heating system, opening up a multitude of possible applications, not only for the transmission of preset values but also for monitoring the heating system with the readout of actual values.

The diagram shows a completed example of the invented device. Depicted are:

Fig. 1, a heating system with a control device in a simplified block diagram.

Fig. 2, the device according to the invention for regulating a heating system,  
in a block diagram, and

Fig. 3, a schematic view of an optional design of the display screen for analog input of  
the control device on a larger scale.

- 4 -

the heating system according to Fig. 1 is designed as a warm-water heating system, having several heating circuits 1, of which only three are depicted. The joint flow 2 and joint return 3 of these heating circuits, supplied with warm water from their joint flow 2 thru a valve 4 each, are connected by a buffer 5, via flow 7, which can be loaded by heating boiler 6. The return 8 of the heating boiler 6 is provided with a charge pump 9. However, the buffer 5 can be loaded by a solar collector 10, whose flow 11 is connected to a heat exchanger 12 of the buffer 5. The cold junction of this heat exchanger 12 is connected to the return 14 of the solar collector 10 via a pump 13.

The control of this heating system, which shows only one of the performance options and can be supplemented and modified in multiple ways, proceeds via a heat controller 15, equipped with set-value memory 15. The set values needed for heat control, especially the time-related preset temperature values for individual heating circuits 1, preferably heating individual rooms, are entered into and stored in the set-value memory 16 by means of an input device 17. The actual values linked to the set values are transmitted via sensor 18 for room temperatures determined by individual heating circuits 1, via a sensor for external temperatures 19, a temperature sensor 20 for the flow temperature of heating boiler 6, a sensor 21 for solar insolation, a sensor for the flow temperature of the solar collector 10, and possibly other sensors, and transmitted to the heat controller 15, which in cases of variances intervenes as usual to offset any variance. For this purpose, the valve controls 4 are monitored by a valve-switching circuit 23 to control the room temperature within the range of individual heating circuits, according to set values. In compliance with the control program, control of the heat circuit pump 24 and the mixing valve 25 by which the return 3 can be connected to the flow 2 of the heating system to control the flow temperature, proceeds by heat controller 15, which also selects the heating boiler 6 and the solar collector 10. The

- 5 -

control circuits 26 and 27 provided for this purpose need not be attached directly to heating controller 15 but may be positioned near heating boiler 6 and/or the solar collector 10, as pointed out in Fig. 1. In this case, a transmission path must be provided; a wireless transmission path 28 appears feasible. To avoid limiting the transmission of signals toward one direction, it is recommended that transceiver-receiver units 29 be allocated to the heating controller 15 as well as to control circuits 26 and 27, especially if control circuits 26 and 27 include secondary control circuits which control heating boiler 6 and/or solar collector 10, depending on actual values collected by sensors, directly connected to control circuits 26 and 27. As an example, according to Fig. 1, this applies to temperature sensor 20 of the flow temperature of heating boiler 6, to sensor 21 for solar insolation, and sensor 22 for the flow temperature of the solar collector 10. Measured variables obtained to control circuits 26 and 27 can be transmitted to heating controller 15, to be monitored and stored.

Input device 17 for set values transmittable to heating controller 15 in Fig. 2 consists of a screen 30 for analog input and of an evaluation circuit 31, connected to the set-value memory 16 at the output site, determining from the analog input the set values for digital storage, applying a method that appears feasible for the control program of heating controller 15. The display screen 30 is built preferably from liquid crystals with a touch-sensitive film, a so-called touch-screen, so that set values can be entered directly by pressing down on the display screen 30 with a pen 32 (Fig. 3) or a finger. Of course, the screen 30 may also be used to display stored set values and/or other measured variables in analog form or as numerical values. For this purpose a control circuit 33 is provided in Fig. 2, used to call up set values from set-value memory 16 and/or the heating controller 15, to be displayed on the screen 30. Thereby

- 6 -

it is possible, for instance, to display the set and actual values, limited for control circuits 26 and 27, on the screen 30 for review.

Fig. 3 displays the input of set values on the screen in more detail. This screen 30 shows a coordinate system whose coordinate axes 34 and 35 display a dimensional graduation, firstly, for the hourly daily sequence and secondly, for the desired room temperature. Using the aforementioned pen 32, the desired march of temperature 36 above the time axis, created by the coordinate axis 34, can be entered. This preset march of temperature can be entered for each day of the week and for each heating circuit 1. For this purpose, input areas 37 for each day of the week and input areas 38 for each heating circuit 1, allocated to each of rooms 1 to 8 are provided on the screen. Thereby, via input areas 37 and 38, the march of preset temperatures can be defined independently from each other for each of the rooms 1 to 8 and for each day of the week and be entered into the set-value memory 16 through the evaluation circuit. The selected input areas 37 and 38 can be read in a display field 39. Aside from the described input areas, an input area 40 is provided – enabling input of set values for heating control during vacation periods without having to overwrite the usual weekly control. In addition, the display screen 30 can be switched via a control panel to display stored set values and/or variable actual values.

Aside from preset temperatures, on- and - off times of the heating circuit pump 24 and/or additional pumps for the purpose of maintaining the march of present temperatures, can be displayed or preset, as shown in a pump-activity diagram 41 of Fig. 3. In addition, The display can be selected in each case via an input area 42 and be switched, for example, to display actual values.

- 7 -

The input device 17, together with the set-value memory 16 and control switch 33, is able to form building unit 43 apart and physically separate from heating controller 15. This is shown, dotted, in Fig. 2. In this case, too, the relevant set values can be transmitted, analog, to heating controller 15 over a distance, by entering the set-value graphs on the screen 30. For this purpose, building unit 43, like heating controller 15, must be equipped with an appropriate transceiver-receiver unit 29, to transmit over a distance.

This invention is, of course, not limited to the presented example. Thus, the control device can be utilized not only for heating but also for the cooling of rooms. In this case, heat has to be removed from the rooms via heating circuits 1. For example, the necessary cooling of the heat transfer medium can proceed via a heat pump. Set values for room temperatures can be entered in analog form.

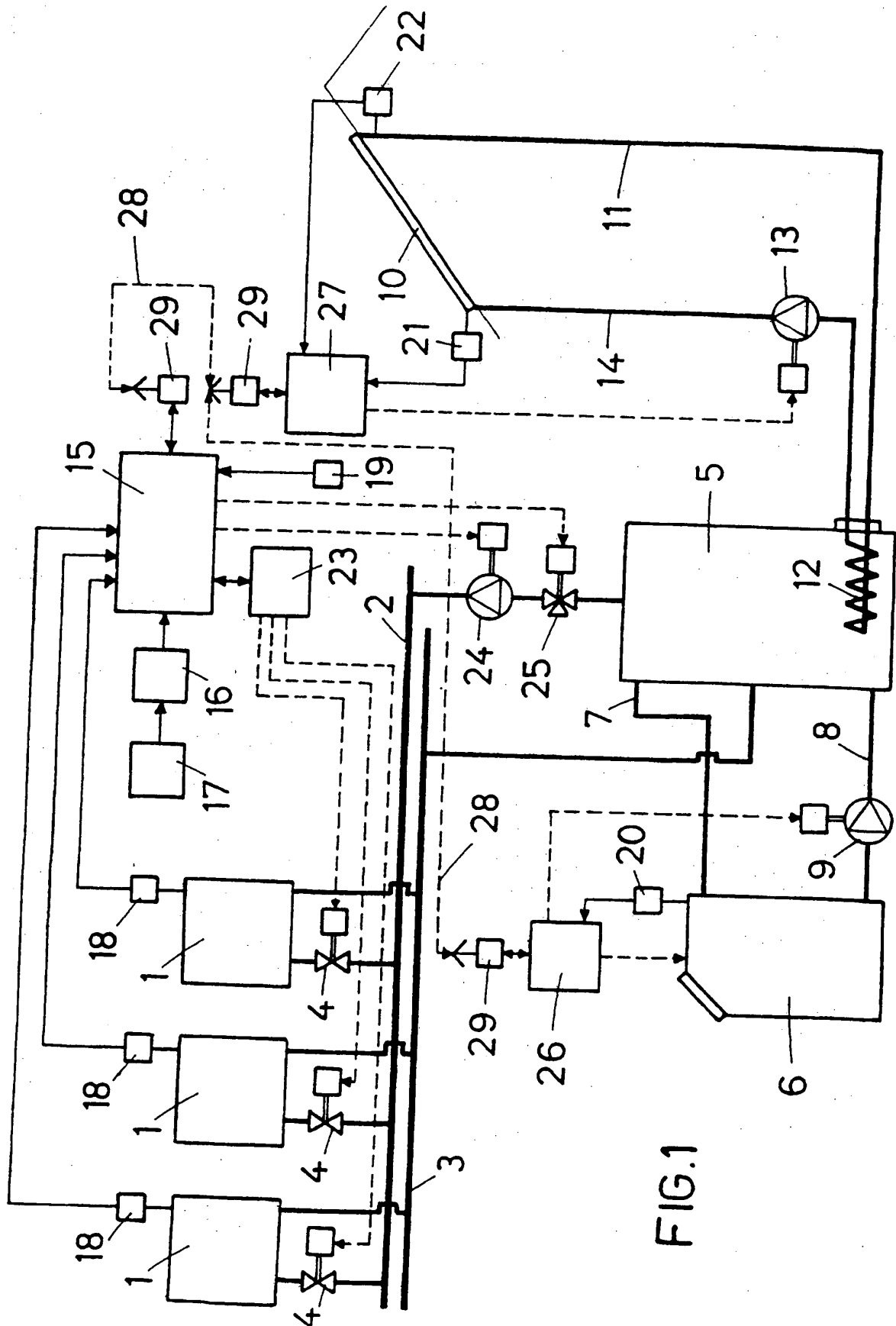


FIG.1

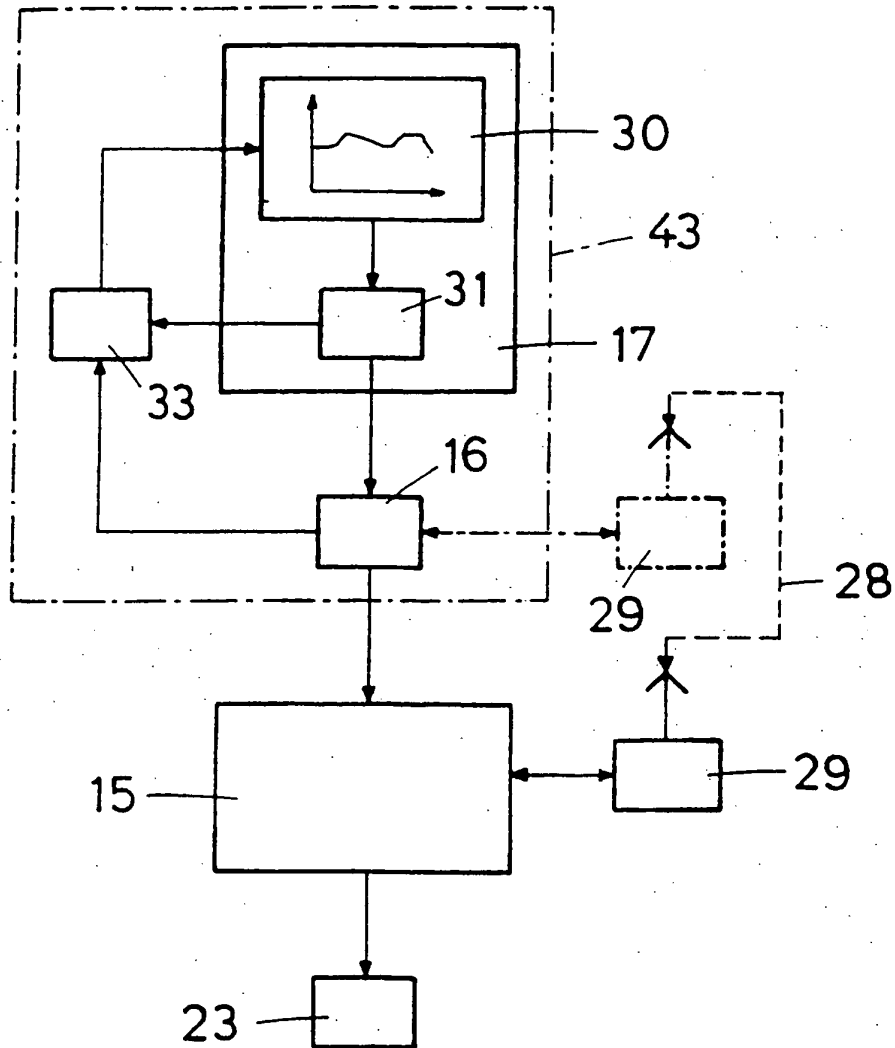


FIG. 2

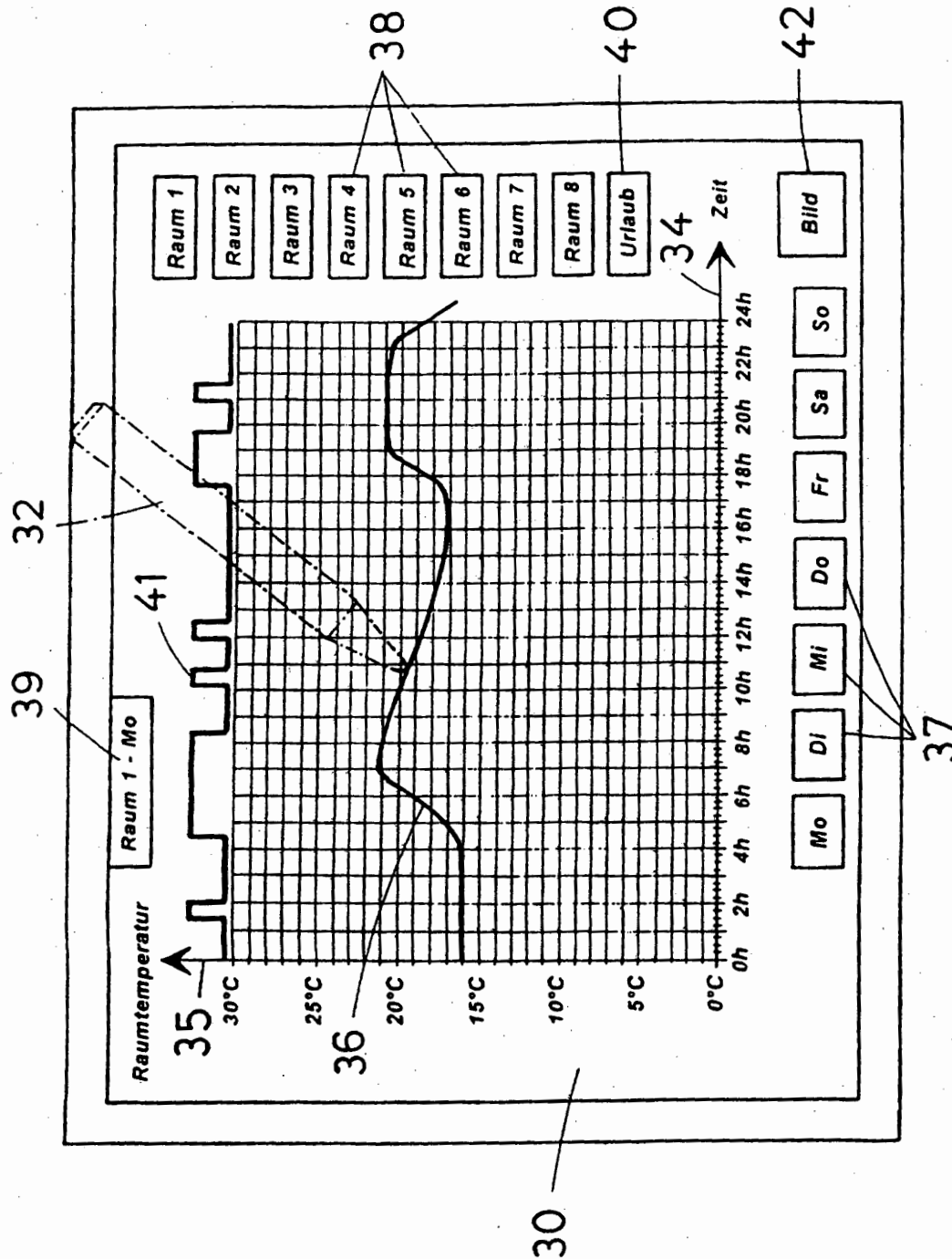


FIG. 3

Fig.3

Legend: Item 35 – room temperature  
Item 39 – Room 1 – Monday  
Item 37 – Days of the week (Tuesday – Sunday)  
Item 38 – Room 1 thru 8  
Item 40 -- Vacation

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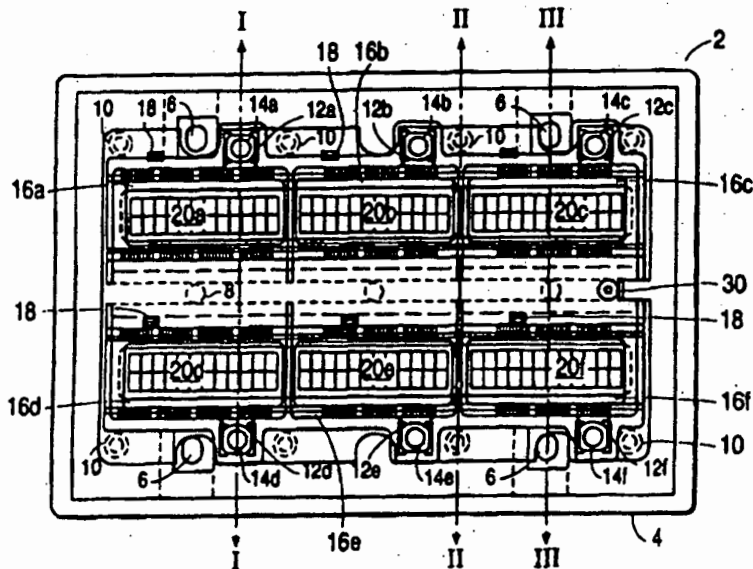
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| <table style="width:100%;"> <tr> <td style="width:50%; vertical-align: top;"> <p>(21) International Application Number: PCT/US96/14520</p> <p>(22) International Filing Date: 18 September 1996 (18.09.96)</p> <p>(30) Priority Data:<br/>60/003,883      18 September 1995 (18.09.95)      US</p> <p>(71) Applicant (for all designated States except US): INTELLINET [US/US]; 2900 South Horseshoe Drive, Naples, FL 33942 (US).</p> <p>(72) Inventors; and<br/>(75) Inventors/Applicants (for US only): STEIN, Michael [US/US]; 10862 Longshore Way West, Naples, FL 34104 (US). KAUFMAN, Toby, Ray [US/US]; 13715 Eldridge Avenue, Sylmar, CA 91342 (US). RICHARZ, Yves, Alexander [CH/US]; 628 South Reese Place, Burbank, CA 91506 (US). TARLOW, Kenneth, Allen [US/US]; 94 Birch Avenue, Corte Madera, CA 94925 (US). NESBITT, Bryce, Craig [US/US]; 1712 Marin Avenue, Berkely, CA 94707 (US).</p> <p>(74) Agent: KILPATRICK &amp; CODY, L.L.P.; Suite 800, 700 13th Street, N.W., Washington, DC 20005 (US).</p> </td> <td style="width:50%; vertical-align: top;"> <p>(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b><br/><i>With international search report.<br/>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p> </td> </tr> </table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                       | <p>(21) International Application Number: PCT/US96/14520</p> <p>(22) International Filing Date: 18 September 1996 (18.09.96)</p> <p>(30) Priority Data:<br/>60/003,883      18 September 1995 (18.09.95)      US</p> <p>(71) Applicant (for all designated States except US): INTELLINET [US/US]; 2900 South Horseshoe Drive, Naples, FL 33942 (US).</p> <p>(72) Inventors; and<br/>(75) Inventors/Applicants (for US only): STEIN, Michael [US/US]; 10862 Longshore Way West, Naples, FL 34104 (US). KAUFMAN, Toby, Ray [US/US]; 13715 Eldridge Avenue, Sylmar, CA 91342 (US). RICHARZ, Yves, Alexander [CH/US]; 628 South Reese Place, Burbank, CA 91506 (US). TARLOW, Kenneth, Allen [US/US]; 94 Birch Avenue, Corte Madera, CA 94925 (US). NESBITT, Bryce, Craig [US/US]; 1712 Marin Avenue, Berkely, CA 94707 (US).</p> <p>(74) Agent: KILPATRICK &amp; CODY, L.L.P.; Suite 800, 700 13th Street, N.W., Washington, DC 20005 (US).</p> | <p>(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b><br/><i>With international search report.<br/>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p> |
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(54) Title: USER INTERFACE FOR HOME AUTOMATION SYSTEM



**(57) Abstract**

Described is a user interface particularly suited for use in a home automation system. This interface combines advantages of a conventional touch screen (such as ease of use and accurate "key" placement) with the advantages of a conventional mechanical keypad (such as reduced cost and tactile feedback). The interface is well suited for use on any wallspace and may be easily reconfigured as necessary to support a host of system functions. The interface utilizes a backlit LCD separated into separate display sections (modules 15 and 17), each having a durable, scratch resistant lens (22). Cantilevered switches (14a to 14f) associated with each display are used to detect a user's selection of a displayed option.

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- 1 -

USER INTERFACE FOR HOME AUTOMATION SYSTEMFIELD OF THE INVENTION

5 This invention relates to an improved interface for  
interacting with a variety of electronically controlled  
systems and appliances. More particularly, the present  
invention relates to an improved touchscreen,  
particularly suited for use in residential or commercial  
automation systems, which provides a consistent, easy to  
10 use interface.

BACKGROUND OF THE INVENTION

In recent years, both the number and variety of  
electronic devices and appliances in use have increased  
15 dramatically. Lighting systems, personal computers  
(PCs), video tape recorders, compact disc (CD) players,  
stereo receivers, and televisions are but a few of the  
most common devices found in both residential and  
commercial settings. Even appliances which rely on non-  
20 electric power sources, such as gas burning furnaces, are  
usually controlled electronically.

Reflecting the variety of devices now available,  
many different systems and devices are used to provide  
more centralized or automated control of the appliances  
25 found in the home and the office. These can be as simple  
as a remote-control entertainment system comprising a CD  
player, stereo and television, or as complex as a  
building environmental control system for regulating HVAC  
and security functions.

- 2 -

A central feature of any automation system is the interface by which the user interacts with the automation system. User interfaces permit one to program future operation or to control different devices from a centralized location. Reflecting the variety of appliances or devices that are to be controlled, user interfaces may range widely in complexity. In some settings, a more complicated interface is necessary to provide the broad range of functionality required. For example, a building control center may be sufficiently complicated to require training for the operator. On the other hand, in many environments, particular residential settings, it is essential that interfaces be easy to use and understand so that the entire range of functionality may be utilized.

Unfortunately, the standard approach now commonly used is for each device or system in a given environment to be controlled according to a particular methodology which might differ dramatically from other systems. For example, a home might include a security system, an entertainment system, an environmental control system, and so forth, each with its own unique interface. Thus, a user may be required to set a thermostat in a first manner, program a VTR in a different manner, and program the security system in yet a different manner. By requiring the user to learn several methods of operating each system or set of devices in the environment, it is more difficult for the user to become familiar with the various systems and to take full advantage of all their features.

- 3 -

Another drawback associated with this standard approach is that the use of different interfaces may result in an increase in the amount of space taken up in the setting. For example, two or more different keypad controllers may be mounted on a wall to separately control individual systems. As a result, there may be a decrease in available wall space and a negative impact on the aesthetic quality of the setting.

Some automation systems attempt to address these limitations through the use of menu driven interfaces which are connected to a single, dedicated control processor. With such a system, a user may control various systems, such as lighting, HVAC, and security, from a single type of interface which uses a common methodology for interacting with the user. In general, such interfaces incorporate a display, typically a cathode ray tube (CRT) or liquid crystal display (LCD), which provides the user with several options for controlling one or more systems in the setting.

Different types of interfaces are used in menu driven systems. In some systems, a touch screen is utilized wherein the user presses a portion of the display screen to make a selection. The user's fingertouch is detected and the display indicates which area of the display has been selected. Alternatively, conventional mechanical switches may be provided in proximity to the display screen. A graphical image on the display device directs the user to the appropriate push-button flanking the display. This approach is

- 4 -

similar to that adopted in connection with many automated teller machines (ATMs).

Touchscreens are advantageous in that the area in which the user is prompted to make a selection is usually identical to the region which is actually acted upon by the user. For example, virtual buttons may be displayed which are selected on the same display area. On the other hand, touchscreens are relatively expensive and require a fair amount of support by processor and memory elements in order to function properly. Moreover, their use may not prove to be as convenient to the average user as more simple mechanical buttons which provide tactile feedback to the user, usually by a button which clicks when fully depressed.

The other above-mentioned approach of providing mechanical switches in proximity to a display screen overcomes these drawbacks, at least in part, in that the mechanical switches may provide tactile feedback. However, since the switches are offset from the display, this approach may require more care in use, particularly in comparison with a touchscreen. In particular, the offset between the switches and the display may make it difficult for a user to determine which button corresponds to a given option. As a result, the user may become disoriented and there may be a delay in the selection of a desired option as the user verifies which switch corresponds to the desired option. Such a delay is clearly unacceptable where the user is attempting to address certain high priority control systems, such as lighting systems or home security. Further, this problem

- 5 -

may be exacerbated where the display screen contains more than a few simple commands. Thus, the combination display/push-button interface is limited by its nature in the amount of information that may be displayed and the  
5 command options that may be offered.

Accordingly, there is a need for an economical, menu-driven interface that permits the user to rapidly and efficiently select a desired function and enter a desired command. There is a related need for the  
10 interface to provide tactile feedback to signal the user that a command has in fact been entered.

#### SUMMARY OF THE INVENTION

It is an object of the invention to meet these needs  
15 and to overcome the above-describe shortcomings of conventional user interfaces.

It is a further object of the invention to provide a user interface which comprises: a liquid crystal display divided into a plurality of regions;  
20 a microcontroller operatively coupled to a host controller, the microcontroller driving the liquid crystal display according to signals received from the host controller so as to display text or images on each of the plurality of regions of the liquid crystal  
25 display; a transparent member covering each of the regions of the liquid crystal display; and a plurality of switch elements disposed proximal to the regions of the liquid crystal display, each of the switch elements being actuated by the transparent member covering it when the  
30 transparent member is depressed by a user; wherein the

- 6 -

microcontroller detects actuation of the switch elements and provides an indication to the host controller in response thereto.

According to one feature of the invention, the user interface further comprises a plurality of light emitting diodes, each disposed proximal to each region of the liquid crystal display, the light emitting diodes being operated by the microcontroller. Optionally, these light emitting diodes are multicolored so as to be indicative of several system states.

According to another feature of the invention, the liquid crystal display is backlit. A light sensor coupled to the microcontroller is used to regulate the intensity of the backlighting of the liquid crystal display depending on the intensity of ambient light detected with the light sensor.

According to another feature of the invention, wherein the transparent member covering the liquid crystal display is made of a scratch resistant, durable material, such as Lexan.

According to still another feature of the invention, the liquid crystal display and the microcontroller are mounted on a printed circuit board which, in turn, is mounted to a wall mounted electrical box. A faceplate is applied to the face of the transparent overlay so as to cover the fasteners which affix assembly to the electrical box.

According to yet another feature of the invention, the host controller provides instructions to the microcontroller whereby a menu of options are displayed

- 7 -

on the liquid crystal display to the user. The user indicates selection of a displayed option by depressing the transparent member over the corresponding region of the liquid crystal display.

5 Additional objects and features of the invention will be apparent from the detailed description of the preferred embodiments set forth below.

#### BRIEF DESCRIPTION OF THE DRAWINGS

10 In the drawings:

Fig. 1A is a front plan view of a printed circuit board and overlay for a user interface in accordance with an embodiment of the invention.

15 Figs. 1B-1D are respective cross-sectional views of the interface of Fig. 1A taken, respectively along lines I-I, II-II, and III-III.

Fig. 2A is a front plan view of a transparent overlay in accordance with an embodiment of the invention.

20 Figs. 2B-2D are respective cross-sectional views of the transparent of Fig. 2A taken along lines A-A, B-B, and C-C.

Fig. 3 is a back plan view of the printed circuit board of Figs. 1A-1D.

25 Fig. 4 is a front plan view of a faceplate in accordance with an embodiment of the invention.

Fig. 5 is a front plan view of the faceplate of Fig. 4 showing an adhesive layer applied thereto.

30 Fig. 6 is a cross-sectional view of the faceplate of Fig. 5 taken along line D-D.

- 8 -

Fig. 7 is a block diagram illustrating the functional aspects of an interface in accordance with the invention.

5 Figs. 8 to 11 are illustrations of various virtual keypads displayed in a menu driven hierarchy.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Preferred embodiments of the invention are now described in reference to the accompanying drawings.

10 Figs. 1 to 6 illustrate the physical construction of one embodiment of the interface according to the invention. The remaining drawings illustrate the functional aspects of this embodiment of the invention.

As described in detail below, the user interface 2  
15 according to the preferred embodiment principally comprises the following components: a printed circuit board (PCB) 34; a transparent overlay 22; and a faceplate 38. The electronic components of the user interface are mounted to the PCB 34, either directly or by mounting on  
20 the reverse side of the PCB 34. The transparent overlay 22 is fastened to the PCB 34 and the combined unit 2 is then mounted in a standard electrical box, such as a three gang box. The faceplate 38 is then applied over the face of the interface to cover the screwheads and to  
25 provide a seamless appearance.

Fig. 1A is a front plan view of the PCB 34 with the transparent overlay 22 attached thereto. Figs. 1B to 1D are respective cross-sectional view taken respectively along lines I-I, II-II, and III-III in Fig. 1A.

- 9 -

Various electronic components are disposed on the front side of the PCB 34. These include two liquid crystal display (LCD) modules (an upper module 15 and a lower module 17) which are each segmented into three display areas so as to provide six display surfaces 20a-20f. In proximity to each of the six display surfaces 20a-20f are respective microswitches 14a-14f and indicator light emitting diodes (LEDs) 18. An optional photosensor 30 is disposed between two of the display portions 14c and 14f.

As explained below, the indicator LEDs 18 serve to provide visual feedback in response to user input and provide an indication of system status. Preferably, bicolored LEDs (red and green) are utilized which can be actuated to produce indications of various states. The indicator LEDs 18 can be turned on, off, or blink. In the on or blinking state, the LEDs 18 can emit a red light, a green light, and also an amber light by lighting the LED both green and red simultaneously. Thus the indicator LEDs 18 are capable of displaying up to seven states (off, solid red, solid green, solid amber, blinking red, blinking green, blinking amber).

In this example, each of the two LCD modules 15 and 17 have displays which are two characters high by forty characters wide. As described below, each display is segmented into through regions, resulting in the loss of six characters per LCD. As a result, each virtual button that is displayed at regions 20a-20f has a display area which is twelve characters wide by two characters high, thus providing a total of twenty-four possible characters

- 10 -

for display. This segmentation economically increases the number of apparent discrete displays, even though only two discrete modules are actually utilized.

5 In the preferred embodiment, the six display regions 20a-20f of the LCDs are individually backlit by a corresponding set of LEDs to provide enhanced visibility to the user. During times when the ambient background light is relatively high, it is necessary that the backlighting be relatively intense so that the display  
10 may be seen. When the ambient light is low, it is preferred that the backlighting be sufficient to illuminate the LCDs but relatively low enough so as not to be distracting. According to one variation of the invention, an optional photosensor 30 is provided on the  
15 face of the PCB to detect when the ambient light has fallen below a predetermined threshold, thereby indicating to the microcontroller that the backlighting should be decreased. According to a second variation, the microcontroller may simply be programmed to maintain  
20 the backlighting at a low level until the virtual keypad is activated by the user, and then return to a low level after a predetermined time has elapsed.

It is a further feature of the invention that the LEDs used to backlight the LCDs may be individually  
25 controlled at each of the display regions 20a-20f. It is thus possible to selectively turn on and off various "virtual buttons" displayed at regions 20a-20f by means of appropriate programming.

As best seen in Fig. 1A, the transparent overlay 22  
30 is attached to the PCB 34 with eight fasteners 10 (screws

- 11 -

in this example). The fasteners 10 extend through respective hollow bevels 11 which extend from the surface of the PCB 34 and through vias in the PCB 34 (see Fig. 1A and 1C). The bevels 11 and four center supports 8  
5 maintain the transparent overlay 22 at a fixed distance from the surface of the LCD display portions 20a-20f. As best seen in the cross-sectional views of Figs. 1C and 1D, the LCDs 15 are disposed between the center supports 8 and the bevels 11 so that the front surfaces 20a-20f of  
10 the LCDs are covered entirely by the transparent overlay 22.

The transparent overlay provides six separate touch areas 16a-16f which cover, respectively, the display surfaces 20a-20f. Each of these touch areas 16a-16f are  
15 connected via a rectangular portion 12a-12f to a post 24 which extends to just above a corresponding microswitch 14a-14f associated with one of the display surfaces 20a-20f. When the pressure is applied to any of the touch areas 16a-16f, a post 24 is consequently pushed down onto  
20 a corresponding one of the microswitches 14a-14f. Thus, the touch areas 16a-16f of the transparent overlay 22 act as cantilevers which activate a corresponding switch 14a-14f associated with one of the display surfaces 20a-20f.

The microswitches 14a-14f provide tactile feedback to  
25 the user through the posts 24 that are coupled to the touch areas 16a-16f.

Once the transparent overlay 22 is fastened to the PCB 34 (and its associated controller board described below), the resulting assembly is mounted within a  
30 standard three gang box (not shown). The assembly is

- 12 -

mounted through four oval shaped openings 6 provided on the transparent overlay 10 (as best seen in Figs. 1A and 1D). These openings 6 are disposed in recesses in the front surface of the overlay 10 so as to be disposed over four of the six screw mounts of the three gang box (not shown). Unlike conventional components that are normally mounted in three gang boxes, oval openings 6 are utilized to permit adjustment of the interface 2 to compensate for any misalignment of the three gang box. The recesses for the oval-shaped openings 6 prevent bulging when the surface of the overlay is covered with the faceplate as described below.

While not shown, the assembled interface 2 according to the preferred embodiment is coupled to a network, such as a home automation system through communication lines and a power line provided to the three gang box. Preferably, conventional twenty gauge wire 14 is utilized to permit standard RS45 communication between the interface and the host processor of the home automation network.

Fig. 2A is a front plan view of the transparent overlay 22. Figs. 2B to 2D are respective cross-sectional views of the transparent overlay 22 taken, respectively, along lines A-A, B-B, and C-C.

In this example, the transparent overlay 22 preferably comprises a resilient, scratch-resistant material, such as polycarbonate GE (generally known as "LEXAN"). While in the preferred embodiment the transparent overlay 22 comprises a single piece, it is designed to provide six touch areas 16a-16f, which in

- 13 -

effect serve as respective clear plastic lenses over the display regions 20a-20f. Each touch area 16a-16f is associated with a post 24 by which the above-mentioned microswitches are activated when any of the touch areas 16a-16f are depressed.

Fig. 3 is a plan view of the rear surface of the PCB 34. As shown, the integrated circuits provided on the rear surface of the PCB include respective driver chips 36a-36f which are connected to the LCDs 15 and 17 and the backlight LEDs. Also mounted on the rear surface of the PCB 34 is a buzzer 28. The buzzer 28 provide audio feedback for a variety of situations. For example, it can be actuate to provide a clicking sound each time one of the microswitches 14a-14f are actuated to provide audio feedback confirming that a touch has resulting in selection of an option. It also may be used to signal an alarm, for example, to indicate that a security system be disarmed in order to avoid sounding an alarm.

The PCB 34 is also provided with two sockets 32 adapted to receive a processor card. While not shown in Fig. 3, this card preferably matches the footprint of the PCB 34 and is disposed parallel to thereto. A relatively inexpensive, standard eight bit microcontroller is disposed on the processor card. As explained below, the functions of the microcontroller include: communicating with the network host controller; controlling the indicator LEDs 18; receiving ambient light level signals from the optional photosensor 30; controlling the backlight LEDs associated with each virtual button; controlling the display drivers which in turn control the

- 14 -

LCDs; detecting actuation of the microswitches 26; and actuating the buzzer 28.

Associated with the microcontroller is flash read only memory (ROM) in which the firmware for basic level functions executed by the microcontroller is written. As known in the art, the use of flash ROM permits in circuit reprogramming of the microcontroller without the necessity of physically removing components from the circuit board.

Fig. 4 is a front plan view of a faceplate 38 which covers the front surface of the assembled interface 2 once it has been mounted to a wall surface. In the preferred embodiment of the invention, the faceplate comprises a silk screen or painted surface having six openings 40a-40f adapted to fit over the touch areas 16a-16f. In this way, the faceplate 38 covers the screwheads which affix the interface to the three gang box so as to provide an aesthetically pleasing, seamless appearance. In a more functional respect, the faceplate clearly defines the touch areas 16a-16f by covering the unused portions of the LCDs 15 and 17 as described above. It thus creates the impression of what is referred to herein as "virtual buttons" each having text or other images displayed thereon.

The faceplate further includes six transparent or translucent openings 42a-42f. These openings are disposed in alignment with the indicator LEDs 18 referred to above. For aesthetic purposes, it is preferable that the openings be translucent to such a degree that the LEDs 18 are visible when lit, and not visible when unlit.

- 15 -

As illustrated in Fig. 5, it is preferred that the faceplate be applied to the surface of the transparent overlay 22 with an adhesive 44. In this way, no fasteners are visible which would interfere with the aesthetic features of the interface.

Fig. 6 is a cross-sectional view of the faceplate 38 taken along a line D-D in Fig. 5. This view illustrates the openings 42b and 42e which are provided in the faceplate 38.

From the foregoing description, it should be apparent that the interface according to the preferred embodiment provides several advantages through its unique design. For example, the cantilevered switches associated with the "virtual buttons" formed below the touch regions of the interface provides sensory feedback, both aural feedback with the buzzer and tactile feedback with the microswitches. The LCDs provide a means for displaying an unlimited number of alphanumeric messages in an economical manner. The use of associated indicator LEDs provide yet another simple, but effective means of conveying information to a user, such as system status.

It will be appreciated that the interface according to the invention can be applied in a large number of environments. By way of illustration, application of the interface in a home automation system is now described in reference to Figs. 7 to 11.

Fig. 7 is a block diagram of the functional interaction between the microcontroller 99 and the above identified components of the interface according to the preferred embodiment. As shown, the microcontroller 99

- 16 -

receives signals from the mechanical switches 98, light sensor 95, and optional infrared sensor 94. In turn, the microcontroller 99 provides appropriate signals to control the LCDs 97, the backlighting panel for the LCDs 96, the LED indicators 93, and the buzzer 91.

The microcontroller 99 communicates with a host computer 91 through a communications port. As noted above, the preferred embodiment utilizes an RS45 communication system. Of course, other means of communication are possible.

Based on signals received from the host processor, the microcontroller 99 displays information to the user through the LED indicators 93 and the LCD panel 97. User input, detected with the cantilevered switch arrangement noted above, is then provided to the host computer.

Based on this user input, the host computer controls various systems 92 connected to the network. As noted above, these controlled systems may include an energy management system, a security system, an entertainment system, or various other systems.

It will be appreciated that the programming for control of user interface and the systems attached to the system principally lies with the host computer. In fact, it is preferred that the user interface utilize a relatively simple microcontroller having sufficient memory and firmware to control basic functions, such as turning on and off the LED indicators and pixels of the LCDs as instructed by the host computer. While it is possible to utilize a more expensive microcontroller, it

- 17 -

is preferred to maintain most processing at the host level so as to reduce cost.

Maintaining most processing at the host level further simplifies any necessary programming revisions since changes can be performed centrally, rather than with each interface. As indicated above, should the need arise to alter the firmware resident at the interface level, flash ROM is utilized so that changes may be made without physically removing ICs from the PCB.

Fig. 8 illustrates an example of the a menu driven virtual keypad display as it appears in the preferred embodiment of the present invention. Preferably, the virtual keypad is designed so that six touch actuated transparent "keys" are superimposed over the LCD display 40 to form a display "page". Information is displayed in each of the six LCD display fields corresponding to a function that is controlled by the host computer. Certain controlled functions may be grouped to form a "menu" according to their level of priority or relatedness. Further, indicator LEDs 101, located proximal to each key, signal the user that a status change in a controlled function has occurred.

In the example illustrated in Fig. 8, the displayed information collectively forms a preconfigured "default menu," wherein information relevant to five high priority home control functions 102-105 are displayed concurrently with a "press for more options" key 107. A hierarchy of menus describing the various systems and subsystems controlled by the host computer may be accessed by actuating the "press for more options" key 107.

- 18 -

In this example, depressing the area over the "Master Lights" virtual key 102 actuates a corresponding mechanical switch through the cantilever action described above. This is detected by the microcontroller, which  
5 sends a corresponding signal to the host computer. In response, the host computer may energize/de-energize a preestablished configuration of room lighting.

Actuating the "More Light Scenes" 105 key displays a preconfigured sub-system menu (not shown) wherein  
10 alternative lighting patterns may be controlled (e.g., pool lighting; front outside lighting; back outside lighting, etc.). The "Now Playing KTWV 94.7" key 103 displays the current channel setting on a radio receiver.

Actuating this key displays a sub-menu illustrated in  
15 Fig. 9, wherein alternate preestablished radio station settings may be accessed or alternate menus configured to control different entertainment systems may be displayed (e.g., compact audio disc player, tape player, laser disc, television, video cassette player, etc.).

20 The "Alarm is NOT Armed" key 106 displays the current status of the home alarm system. Depressing this key accesses an alarm system sub-menu illustrated in Figure 12 for controlling various alarm system functions.

The "Great Room Volume 25%" key 104 displays the current  
25 audio volume setting for speakers located in the great room. Depressing this key accesses the great room audio volume control sub-menu illustrated in Figure 11 by which various audio functions may be controlled (e.g., volume up, volume down, mute, audio power off, etc.).

- 19 -

Depressing the "Press for More Options" key 42 accesses alternative preconfigured sub-menus (not shown).

Fig. 9 illustrates an example of an alarm system sub-menu as it may appear on the keypad display after  
5 depressing the "Alarm is NOT Armed" key 106 in Fig. 8. Referring to Fig. 10, the alarm system sub-menu displays on the keypad display five functions 122-126 and a "Press to Exit/Return" function 127. The "Press to Exit/Return" key 127 returns the user to the default menu from the  
10 sub-system menu as illustrated in Fig. 10.

The functions displayed on the default menu illustrated in Fig. 8 and the various sub-menus illustrated in Figs. 9-11 may be optimized for an individual user's application to provide instant access  
15 to the most frequently used functions, including high priority home control functions such as security or lighting. According to the preferred embodiment of the invention, the upper left key of the default menu displays the main lighting scene, and the lower right key  
20 displays a "Press For More Options" to access subsequent menus. The invention is also designed so that the default menu will be displayed after a preset time-out period.

The default menu also provides access to all  
25 functions and subsystems that do not appear on the default menu. In the preferred embodiment of the present invention, if more than five subsystems are being controlled, four subsystems will be displayed on the main menu and additional subsystems can be accessed by  
30 pressing the "Press for More Options" key.

- 20 -

It will be apparent that the number of systems that can be accessed by the invention is not limited by its design. According to the preferred embodiment of the invention, subsystem menus may provide up to five  
5 functions on one display page, or four functions with a "Press for More Options" key to access additional subsystem functions. Thus, a very large number of subsystems may be accessed using the present invention.

The invention has been now been described in  
10 fulfillment of the above noted objects. Specifically, a user interface has been described which is particularly suited for use in a home automation system. This interface combines advantages of a conventional touch screen (such as ease of use and accurate "key" placement)  
15 with the advantages of a conventional mechanical keypad (such as reduced cost and tactile feedback).

While the invention has been specifically described with reference to particular aspects, features, and embodiments thereof in relation to its preferred  
20 embodiment as a keypad interface for a home control system, other variations, modifications, and alternate embodiments will be apparent to those skilled in the art.

It is intended that such variations, modifications and alternate embodiments are to be regarded as being within  
25 scope of the invention.

- 21 -

WHAT IS CLAIMED IS:

1. A user interface comprising:

a liquid crystal display divided into a plurality of regions;

5 a microcontroller operatively coupled to a host controller, the microcontroller driving the liquid crystal display according to signals received from the host controller so as to display text or images on each of the plurality of regions of the liquid crystal display;

10 a transparent member covering each of the regions of the liquid crystal display; and

a plurality of switch elements disposed proximal to the regions of the liquid crystal display, each of the switch elements being actuated by the transparent member covering it when the transparent member is depressed by a user;

15 wherein the microcontroller detects actuation of the switch elements and provides an indication to the host controller in response thereto.

20 2. A user interface according to claim 1 further comprising a plurality of light emitting diodes, each disposed proximal to each region of the liquid crystal display, the light emitting diodes being operated by the microcontroller.

25 3. A user interface according to claim 2 wherein said light emitting diodes are multicolored.

30

- 22 -

4. A user interface according to claim 2 wherein the microcontroller operates the light emitting diodes on the basis of signals received from the host computer.

5 5. A user interface according to claim 1 wherein the liquid crystal display is backlit.

6. A user interface according to claim 5 further comprising a light sensor coupled to the microcontroller, the microcontroller regulating the intensity of the backlighting of the liquid crystal display depending on the intensity of ambient light detected with the light sensor.

15 7. A user interface according to claim 1 wherein the transparent member is made of Lexan.

8. A user interface according to claim 1 wherein the liquid crystal display and the microcontroller are mounted on a printed circuit board.

9. A user interface according to claim 1 wherein the printed circuit board is mounted to a wall mounted electrical box.

25 10. A user interface according to claim 1 further comprising a faceplate which covers fasteners which mount the printed circuit board to the electrical box.

- 23 -

11. A user interface according to claim 10 wherein the faceplate is applied to the printed circuit board with an adhesive.

5           12. A user interface according to claim 1 wherein the host controller provides instructions to the microcontroller whereby a menu of options are displayed on the liquid crystal display to the user.

10           13. A user interface according to claim 12 wherein the user indicates selection of a displayed option by depressing the transparent member over the corresponding region of the liquid crystal display.

15           14. A user interface according to claim 5 wherein predetermined regions of the liquid crystal display are backlit by separately controlled light emitting diodes, whereby selected portions of the liquid crystal display are operated independent of other portions.

I/9

FIG. 1A

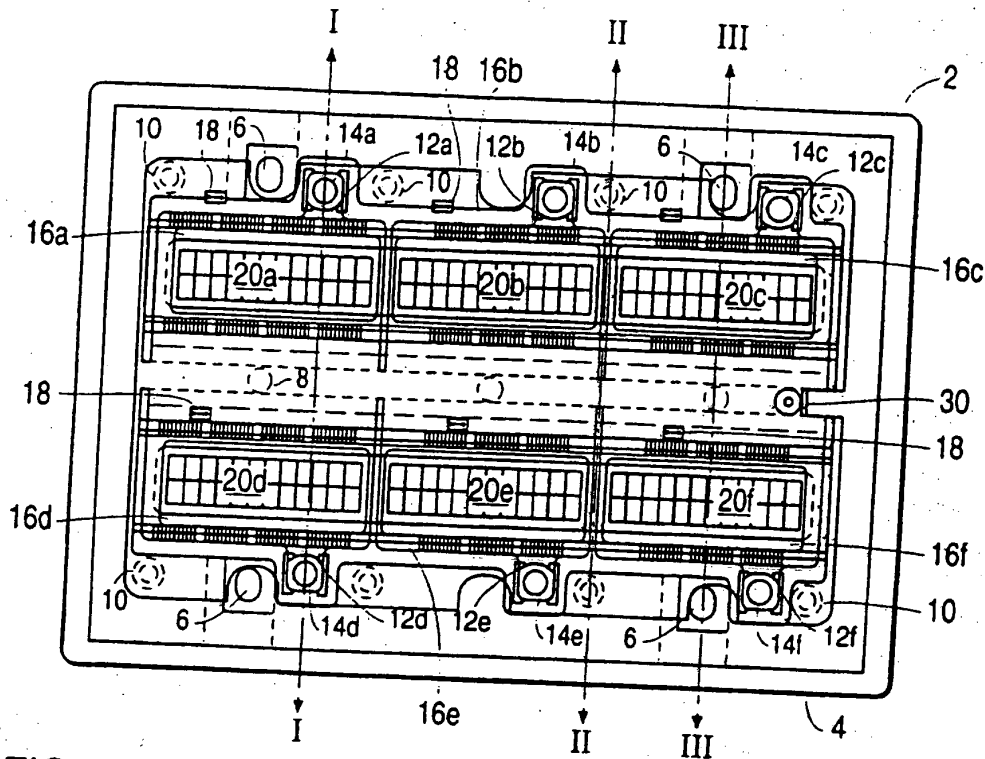


FIG. 1B

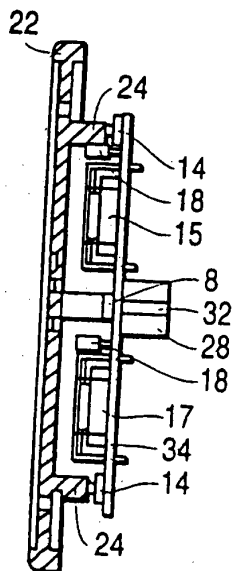


FIG. 1C

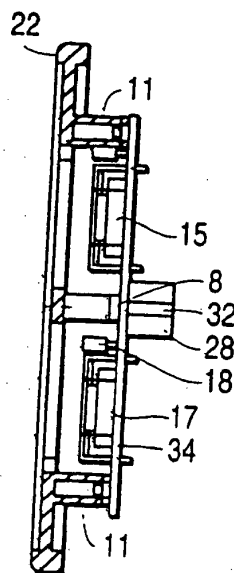
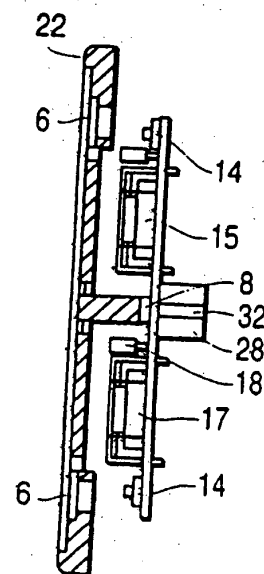


FIG. 1D



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2/9

FIG. 2A

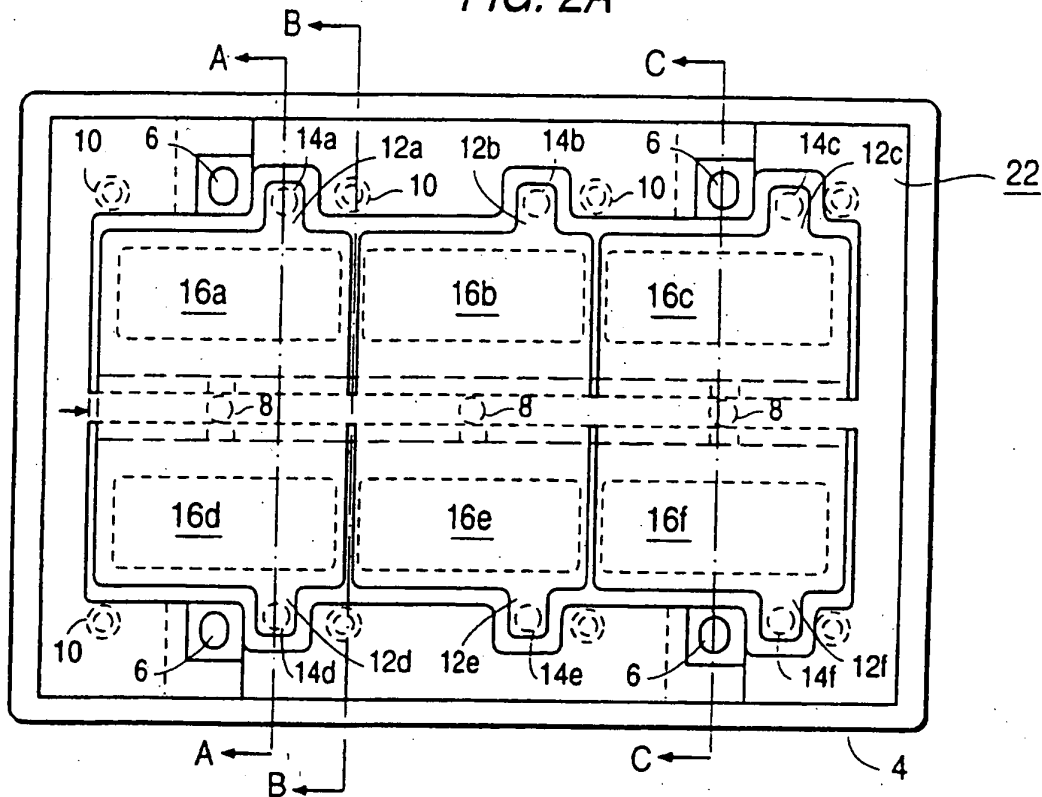


FIG. 2B

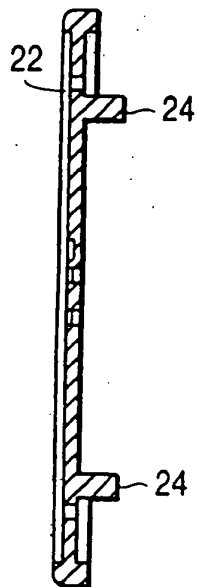


FIG. 2C

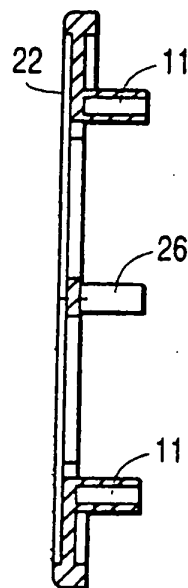
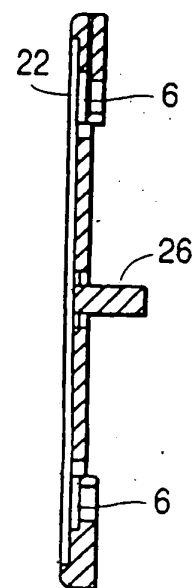
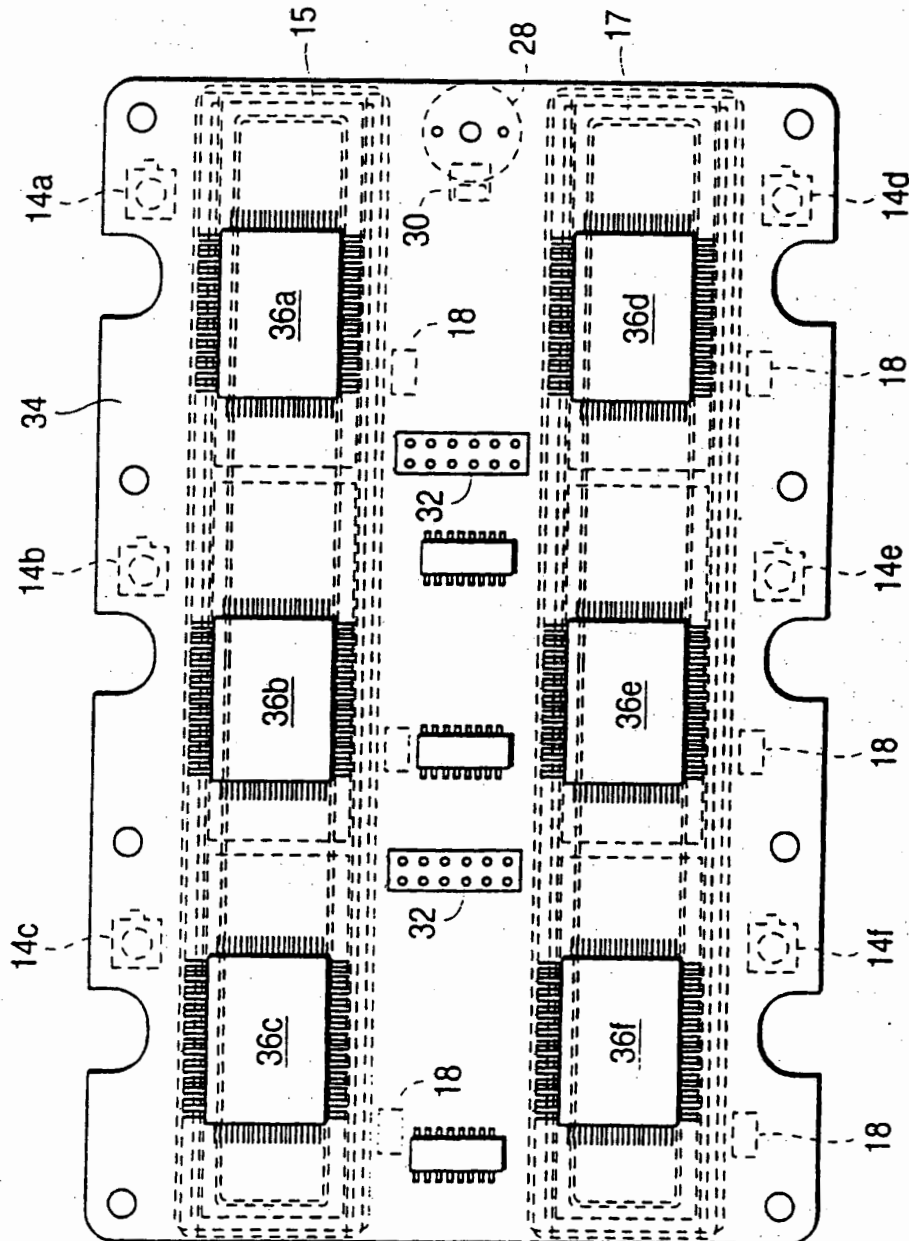


FIG. 2D



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FIG. 3



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FIG. 4

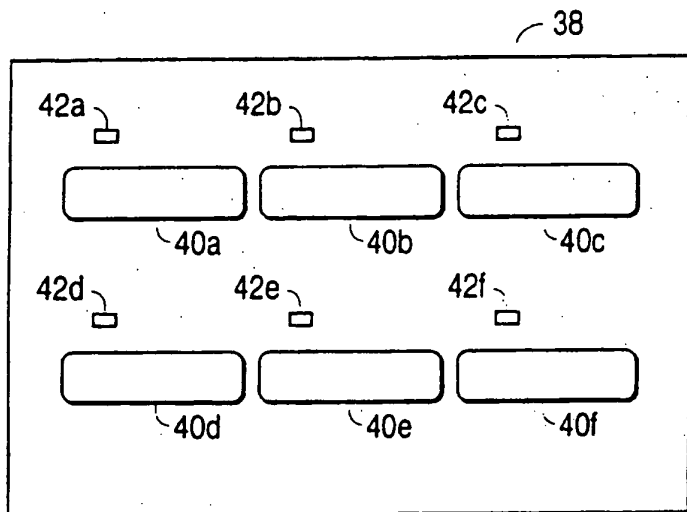


FIG. 6

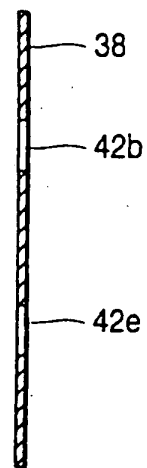
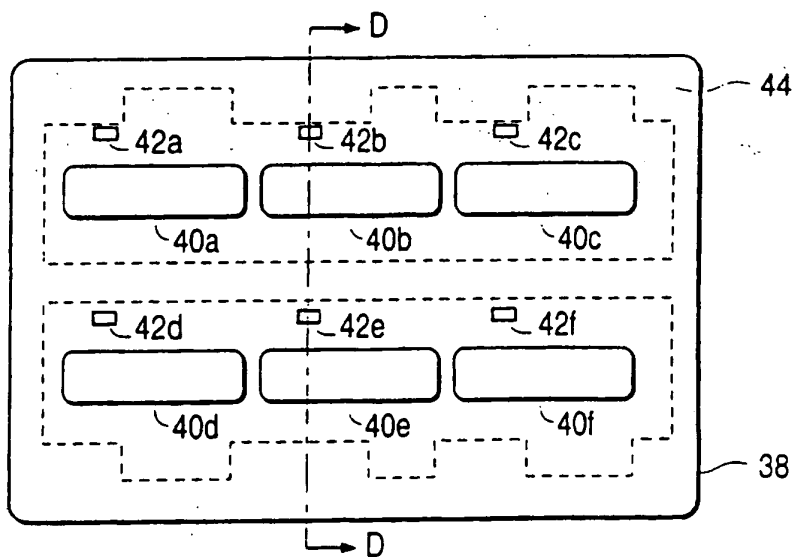
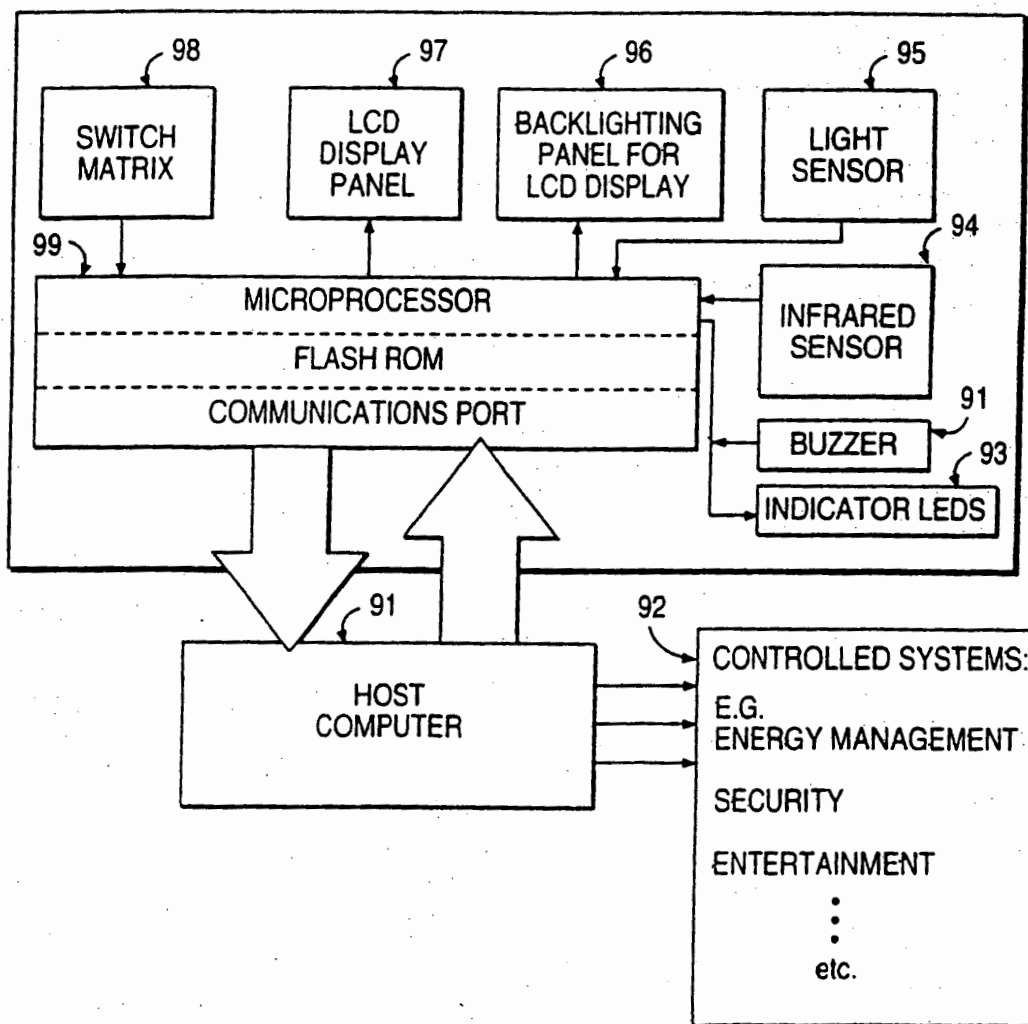


FIG. 5



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FIG. 7



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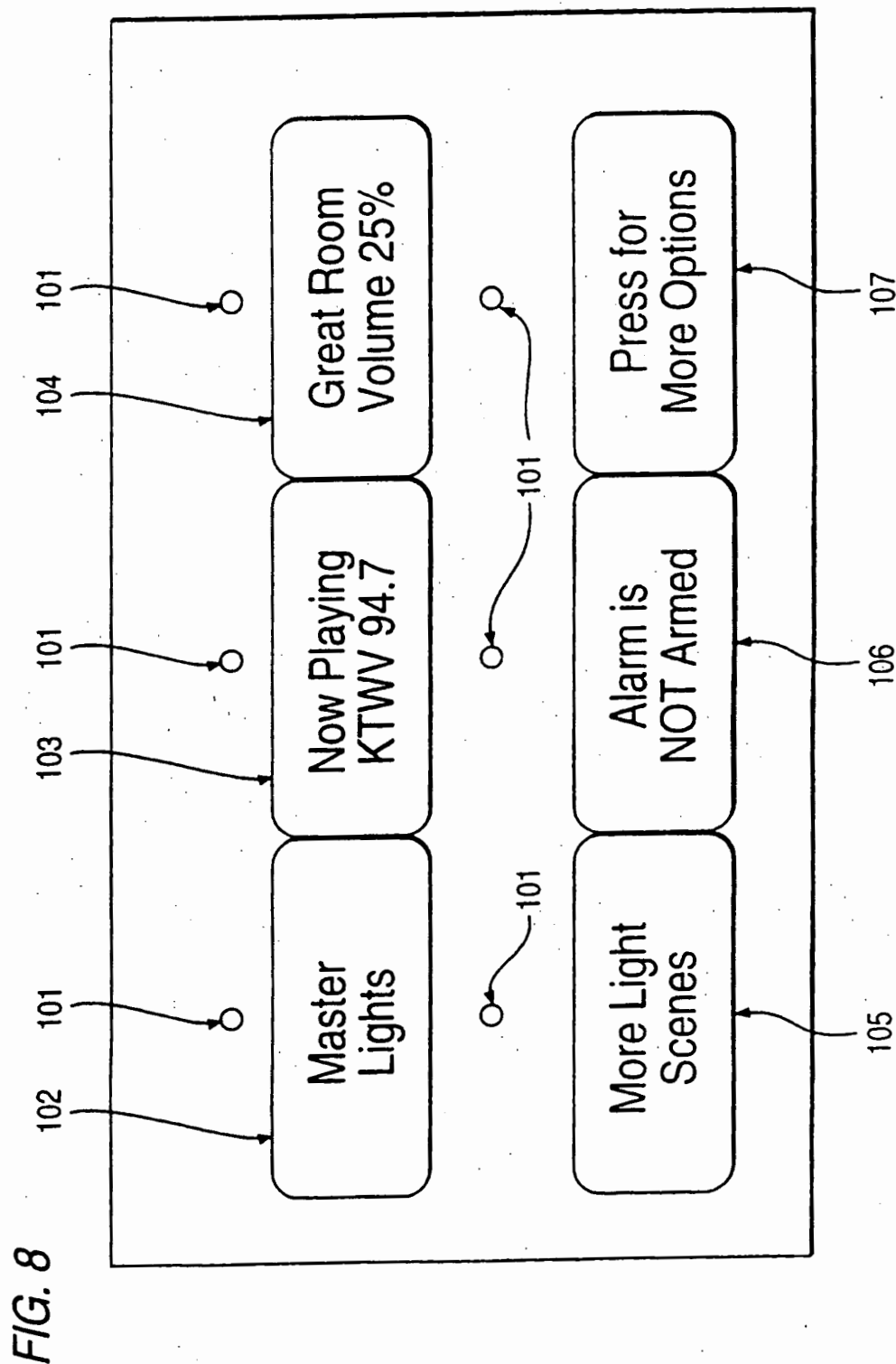
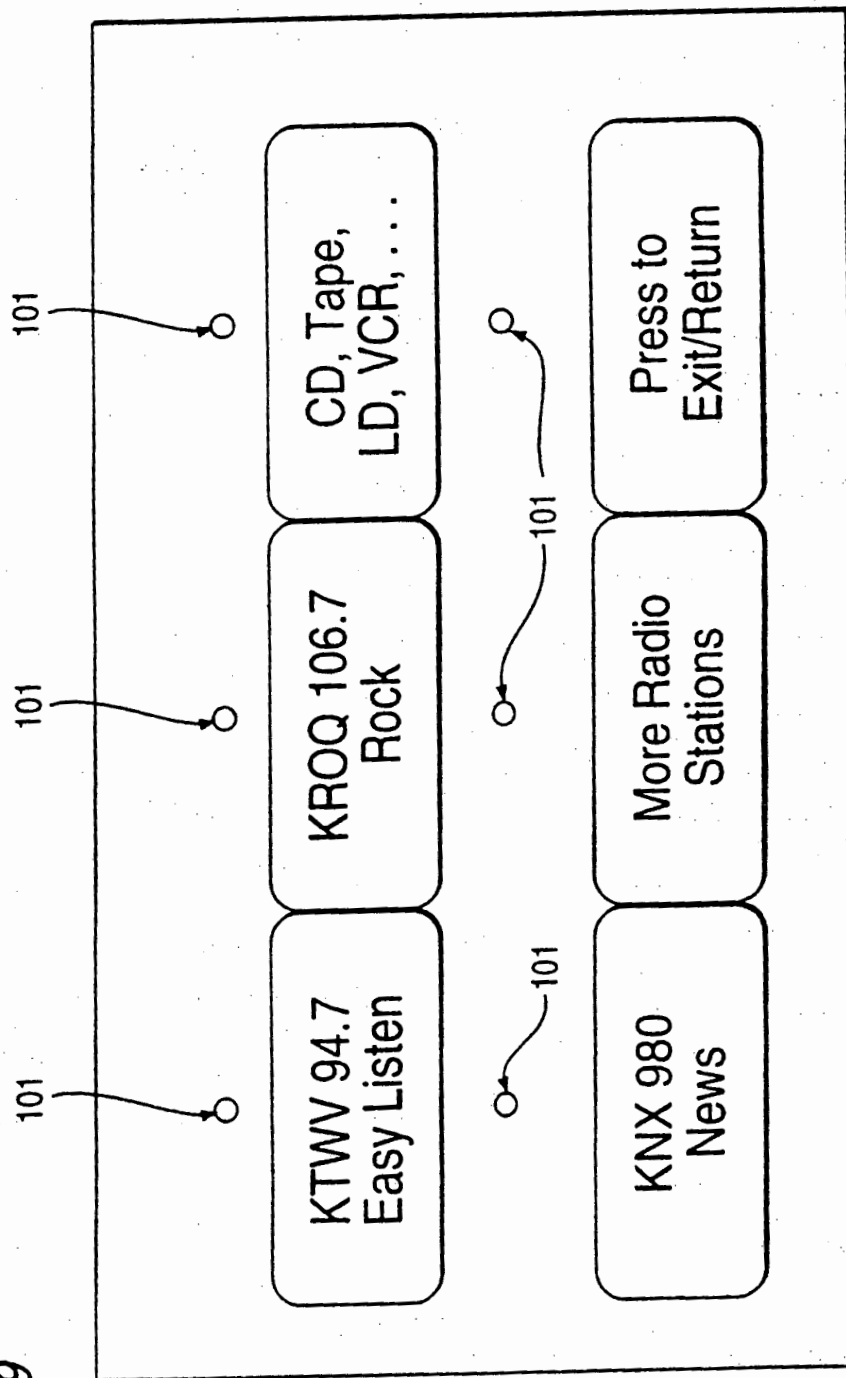


FIG. 9



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FIG. 10

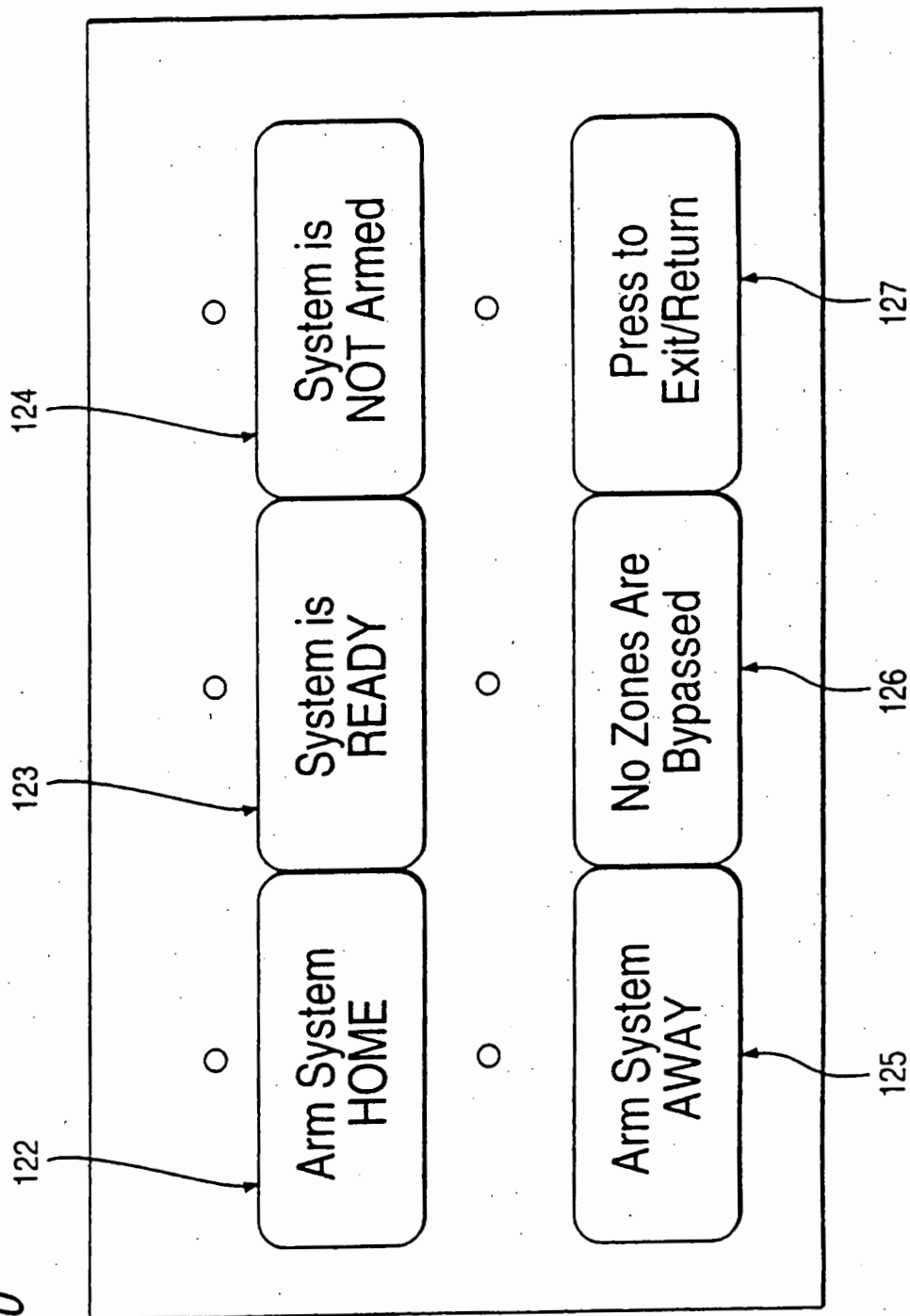
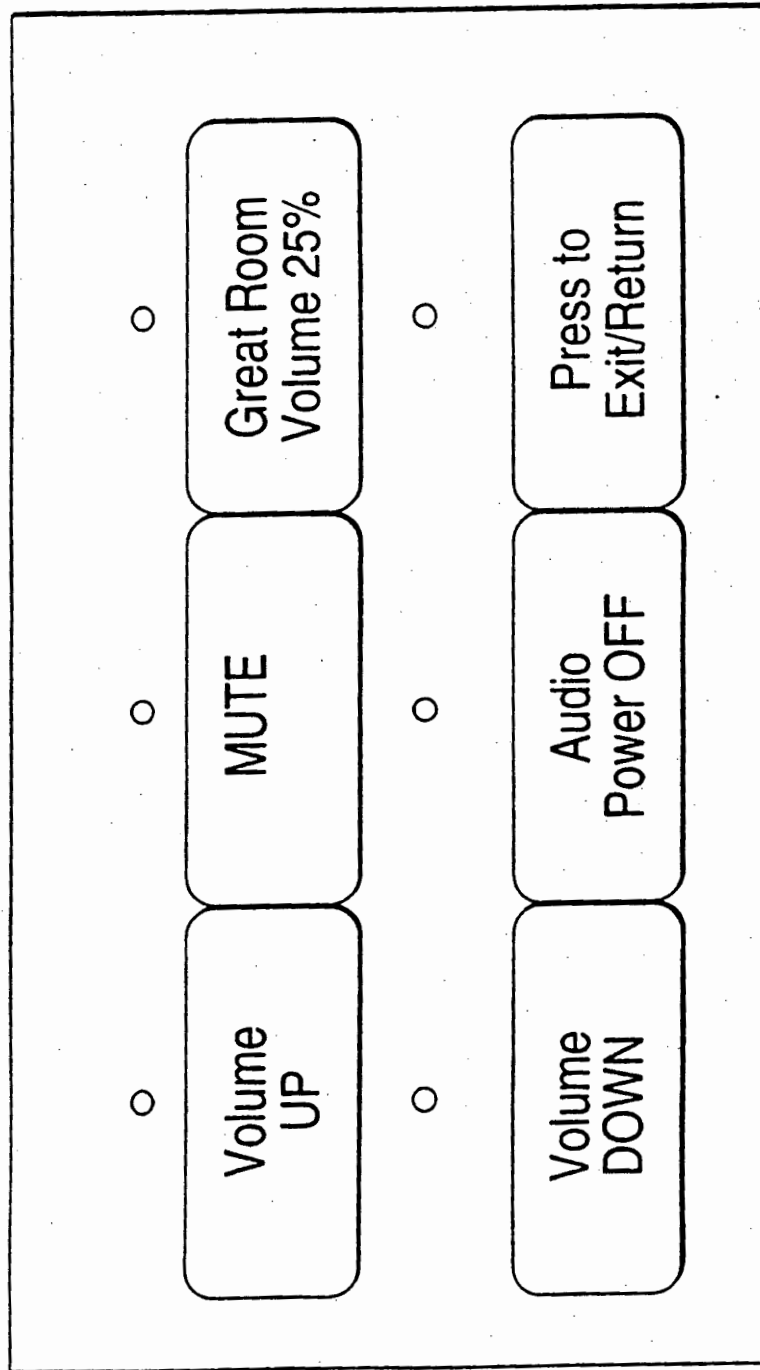


FIG. 11



# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US96/14520

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : G09G 5/00  
US CL : 345/156

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 345/156, 170, 171, 171, 172, 173, 83, 146

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS, MAGAZINE DATABASE, IAC(SM)COMPUTER DATABASE

search terms: touch screen or panel, smart home or house, microcontrollers or processors, LCD, LED, light sensor

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                 | Relevant to claim No. |
|-----------|----------------------------------------------------------------------------------------------------|-----------------------|
| X         | US, A, 4,821,029 (LOGAN ET AL) 11 April 1989, figure 1, and column 3, line 45 to column 4 line 15. | 1                     |
| Y         | US, A, 5,396,226 (WAKE ET AL) 07 March 1995, figures 1, 2 and 3, and abstract.                     | 1-14                  |
| Y         | US, A, 5,034,602 (GARCIA, JR. ET AL) 23 July 1991, figure 2.                                       | 1-14                  |
| Y         | US, A, 3,187,321 (KAMENY) 01 June 1965, figure 2.                                                  | 1-14                  |
| Y         | US, A, 4,810,937 (HAVEL) 07 March 1989, abstract.                                                  | 3                     |
| Y         | US, A, 5,097,396 (MYERS) 17 March 1992, abstract.                                                  | 5,6,14                |

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

|                                                                                                                                                                         |                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| * Special categories of cited documents:                                                                                                                                | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention                                              |
| "A" document defining the general state of the art which is not considered to be of particular relevance                                                                | "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone                                                                     |
| "E" earlier documents published on or after the international filing date                                                                                               | "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art |
| "I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | "&" document member of the same patent family                                                                                                                                                                                                    |
| "O" document referring to an oral disclosure, use, exhibition or other means                                                                                            |                                                                                                                                                                                                                                                  |
| "P" document published prior to the international filing date but later than the priority date claimed                                                                  |                                                                                                                                                                                                                                                  |

Date of the actual completion of the international search  
19 DECEMBER 1996

Date of mailing of the international search report  
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Box PCT  
Washington, D.C. 20231

Facsimile No (703) 305-3230

Authorized officer

JOSEPH ACOSTA *Jon Hill*

Telephone No. (703) 305-4700

## INTERNATIONAL SEARCH REPORT

Int. l. application No.  
PCT/US96/14520

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages          | Relevant to claim No. |
|-----------|---------------------------------------------------------------------------------------------|-----------------------|
| Y         | US, A, 5,384,577 (MCLAUGHLIN ET AL) 24 January 1995, abstract and column 2, lines 26 to 28. | 6                     |
| Y         | US, A, 5,440,208 (USKALI ET AL) 08 August 1995, figure 3.                                   | 8, 14                 |
| Y         | US, A, 4,066,850 (HEYS, JR) 03 January 1978, figures 1, 2, 3, and 4.                        | 9,10,11               |
| Y         | US, A, 4,360,716 (FIORELLA) 23 November 1982, abstract.                                     | 11                    |
| Y         | US, A, 4,827,410 (CORREN) 02 May 1989, column 6, lines 54 to 55.                            | 7                     |
| Y         | US, A, 5,307,086 (GRIFFIN ET AL) 26 April 1994, figures 1 to 4.                             | 12, 13                |

Form PCT/ISA/210 (continuation of second sheet)(July 1992)\*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Title: PROGRAMMABLE THERMOSTAT  
EMPLOYING A FAIL SAFE REAL TIME  
CLOCK

Inventor(s): Howard Rosen

Serial No.:

Filing Date:

Group No.:

Examiner:

Attorney Docket No.: 0404.2A4

TRANSMITTAL LETTER:  
REGULAR PATENT APPLICATION

COMMISSIONER FOR PATENTS

Sir:

Transmitted hereunder for filing is  
the above patent application and/or  
related documents as listed below.

Papers Which Are Required for Filing Date:

- i) Pages of Specification: 11
- ii) Pages of Claims: 4
- iii) Pages of Drawings: 5
- iv) Pages of Abstract: 1

Additional Papers Enclosed:

- ☒ Declaration/Power of Attorney
- ☒ Information Disclosure Statement / Remarks
- ☒ Credit Card Authorization for \$385
- ☒ Copies of Cited Prior Art

|                 |                                                                 |
|-----------------|-----------------------------------------------------------------|
| Inventor(s)     |                                                                 |
| #1 Howard Rosen | Address #1: Lyncroft Road, Hampstead, Quebec,<br>H3X 3E3 Canada |

Address all correspondence to: David T. Bracken, The Law Office of David T.  
Bracken, 4839 Bond Avenue, Orange, CA 92869  
Phone: 714-744-4798

- ☒ Applicant(s) claim small entity status for this application as per 37 CFR 1.9 and 27.
- ☒ Pursuant to 37 CFR 1.211, Applicant hereby requests nonpublication with this application. The application is not to be published under 35 U.S.C. 122(b). Applicant certifies that the invention disclosed in the application has not been and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

*David T. Bracken*

Attorney for Applicant(s)

David T. Bracken, Reg. No. 37522

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*D. Bracken*  
Signature: David T. Bracken  
Date of Mailing: June 24, 2004

1       PROGRAMMABLE THERMOSTAT EMPLOYING A FAIL SAFE REAL TIME CLOCK

2       Inventor: Howard Rosen

3       This application is a continuation in part of Serial No. 10/060,768 filed 1/30/2002.

4       Field of the Invention

5             This invention relates to the art of thermostats and, more particularly, to a programmable  
6       thermostat incorporating a fail safe real time clock and which does not require battery or other  
7       backup device in case of a power failure.

8       Background of the Invention

9             Thermostats have been used for many years as temperature sensitive switches which  
10       control heating and/or cooling equipment for conditioning a space in which a thermostat, or a  
11       temperature sensor connected to the thermostat, is placed. In the well known manner, a simple  
12       thermostat can be adjusted to establish a temperature set point such that, when the temperature in  
13       the conditioned space reaches the set point, the thermostat interacts with the heating  
14       and/or/cooling equipment to take suitable action to heat or cool the conditioned space as may be  
15       appropriate for the season.

16            Modern thermostats, which take advantage of the ongoing rapid advances in electronic  
17       technology and circuit integration, have many features which provide more precise supervision of  
18       the heating and/or cooling equipment to achieve more economical and more comfortable  
19       management of the temperature of a conditioned space. Many modern thermostat include a real  
20       time clock, a memory and a data processor to run a process control program stored in the  
21       memory to accurately measure the temperature of a temperature sensor disposed in the  
22       conditioned space and to send control signals to the heating and/or cooling equipment to closely  
23       control the temperature of the conditioned space. The use of programmed thermostat systems

1 permits anticipating and minimizing hysteresis or overshoot of the temperature in the conditioned  
2 space. In addition, the program can specify different set points at different times of the day and  
3 days of the week and may also include a “vacation” mode which employs different set points  
4 when the conditioned space is not occupied for an extended period.

5 Most such modern thermostats are programmable by a user. Typically, a programmable  
6 thermostat incorporates a tactile user interface with various buttons (or representations of buttons  
7 on a touch screen) to be touched in a precise sequence to program set points (which may vary  
8 with the time of day and day of the week) for programmable time periods and which may include  
9 both normal and vacation modes. The programming sequence may be followed on a display,  
10 typically a liquid crystal display, and when the programming steps have been completed, the  
11 thermostat is switched the immediately desired operational mode.

12 The purpose of a vacation mode is to maintain the temperature of a conditioned space  
13 which will be unoccupied for a period at a value which will substantially lower the cost of energy  
14 to heat/cool the conditioned space but which ensures that the temperature will not fall into a  
15 range at which damage to the premises, for example, freezing pipes, will occur. The operation of  
16 programmable thermostats in the vacation mode is straightforward and well known. A separate  
17 program from normal operation is entered by whatever procedure is provided in a given  
18 thermostat. The vacation mode may include one or more periods a day for which set point  
19 temperatures may be entered. In cold climates, a heating temperature set point will be selected  
20 by a user to be suitable, say 45° F, such that freezing of water pipes will not take place. If, for  
21 example, self sufficient pets are left behind for a few days, a higher temperature, say 60° F, might  
22 be selected. The choice is within the purview of the user. Similarly, in hot climates, a user might  
23 select a temperature of, say, 90° F or even higher to effect substantial savings in the cost of

1 energy for cooling, but not so high as to cause damage to items in the space. Again, if, for  
2 example, pets are left behind, a more comfortable temperature of 80° F or so might be selected.

3 Some programmable thermostats incorporating a vacation mode of operation also provide  
4 for storing the date and even time of day that the occupant(s) of the conditioned space will return  
5 such that operation of the space conditioning equipment may automatically earlier be returned to  
6 a normal mode of operation in anticipation of the return of the occupant(s), thus ensuring a  
7 comfortable temperature in the conditioned space at that time.

8 Most commonly, power to a programmable thermostat is supplied from the controlled  
9 space conditioning equipment, and either a battery or very high capacity capacitor (“supercap”)   
10 provides backup power to “ride out” equipment power failure (“outage”) until power is restored.  
11 However, these are not fail safe expedients. Batteries must be changed at intervals to ensure that  
12 the thermostat will continue to hold its time and setting throughout an outage, but this  
13 maintenance task is often ignored or followed sporadically. Supercaps, on the other hand, are  
14 susceptible over time to developing leakage which greatly diminish their charge-storing capacity;  
15 i.e., they may develop a resistance across their plates which is sufficiently low (even though the  
16 resistance value might ordinarily thought to be very high in other circuits) that a charge stored  
17 during normal operation discharges to an insufficient level during a power outage before power is  
18 restored.

19 In either instance, the real time clock loses its current time and date values. This state,  
20 particularly if the outage occurs while the thermostat is operating in the vacation mode, can have  
21 drastic consequences and, at best, can be a significant inconvenience. If, upon the restoration of  
22 power, the thermostat enters a programming mode (as if the thermostat were newly installed and  
23 because all programming and/or current time and date information has been lost), the normally

1 conditioned space will not be heated or cooled as the case may be such that the reasons set forth  
2 above for using the vacation mode will not be met. Even if the thermostat has the capability of  
3 restarting in its operational mode at the time of the outage (e.g., if the processor memory includes  
4 non-volatile random access memory for storing changeable information such as set up and mode  
5 data and can restart the real time clock at, say, some default date), the thermostat real time clock  
6 will not have the correct time or date such that, for example, in the vacation mode, the system  
7 will not correctly anticipate the return of occupants and thus will not necessarily earlier resume  
8 normal operation to render the space comfortable by the time the occupants return.

9 It will therefor be apparent to those skilled in the art that it would be highly desirable to  
10 provide a fail safe real time clock in a programmable clock, particularly a thermostat  
11 incorporating a vacation mode of operation.

#### 12 Objects of the Invention

13 It is therefore a broad object of this invention to provide a thermostat which incorporates  
14 a fail safe real time clock.

15 It is another broad object of this invention to provide a thermostat which does not require  
16 a backup source of energy for continuing thermostat status during an outage.

17 It is a more specific object of this invention to provide a thermostat having a real time  
18 clock and a non-volatile random access memory in which the current time and date are  
19 periodically read from the real time clock into the random access memory such that, in the event  
20 of an outage, the last time and date previously stored is recovered from the non-volatile random  
21 access memory upon the restoration of power to reset the real time clock in anticipation of  
22 resuming operation in the mode running at the time of the outage.

1 In an alternative and supplementary aspect, it is a more specific object of this invention to  
2 also periodically update - and also initialize after an outage - the real time clock by a signal from  
3 the National Institute of Standards and Technology or other source of precision time.

#### 4 Summary of the Invention

5 Briefly, these and other objects of the invention are achieved, in a programmable  
6 thermostat having a real time clock by periodically, during normal powered operation, storing the  
7 current time and date in a non-volatile random access memory such that, in the event of an  
8 outage, the last time and date previously stored is recovered from the non-volatile random access  
9 memory and used for subsequent operations when power is restored. This provides an acceptable  
10 reset of the clock which will only be off current time by an amount represented by the period  
11 between the last update and the return of power. The real time clock can subsequently be set to  
12 the current time in the usual manner. Thus, the need for backup power, such as a battery or a  
13 supercap, is eliminated. In one embodiment, the real time clock is also periodically updated by a  
14 signal from the National Institute of Standards and Technology (or other source of precision  
15 time). Accordingly, the real time clock is always close to the correct time during normal  
16 operation, and when the thermostat is recovering from a power failure, the real time clock will be  
17 sufficiently close to effectively permit resumption of normal or vacation mode operation as in the  
18 simpler embodiment and will also automatically promptly be set to the correct current time. If  
19 the precision time signal is unavailable for some reason, the real time clock will still be reset by  
20 the information store in the non-volatile random access memory.

#### 21 Description of the Drawing

22 The subject matter of the invention is particularly pointed out and distinctly claimed in  
23 the concluding portion of the specification. The invention, however, both as to organization and

method of operation, may best be understood by reference to the following description taken in conjunction with the subjoined claims and the accompanying drawing of which:

FIG. 1 is a block diagram of an exemplary space conditioning system incorporating a thermostat with backup power, in case of an outage, supplied from a battery or supercap in accordance with the prior art;

FIG. 2 is a block diagram of a portion of the processor component of the thermostat particularly showing aspects of the thermostat clock and its support circuitry in a first exemplary embodiment of the invention;

FIG. 3 is a process flow chart illustrating a part of the thermostat control program by which an updating operation is carried out according to the practice of the invention;

FIG. 4 is a process flow chart showing a part of the control program restart when power has just been restored after an outage according to the invention; and

FIG. 5 is a block diagram of a portion of the processor component of the thermostat particularly showing aspects of the real time clock and its support circuitry in a second exemplary embodiment of the invention

#### Description of the Preferred Embodiment(s)

Referring first to FIG. 1, an exemplary thermostat includes a processor 1, a touch screen 2 and a temperature sensor 5 which is disposed in a conditioned space 4. It will be understood that the processor 1 and the touch screen 2 are typically situated in a common housing (not shown). The sensor 5 may also be situated in the common housing or remotely as shown, all as very well known in the art. The common housing is usually, but not necessarily, placed in the conditioned space 4. Thus, those skilled in the art will understand that the block diagram of FIG. 1 is very

1 general in order to best explain an exemplary environment in which the invention can be  
2 practiced as will be discussed below.

3 The processor 1 includes a central processing unit (CPU) 9 in communication with a  
4 memory 8 for storing data and program information and also, via an input/output unit (I/O unit)  
5 10, a touch pad 11 and a liquid crystal display (LCD) 12 which constitute the touch screen 2.  
6 The memory 8 may include a read-only part which is factory-programmed and a random-access  
7 part which stores data subject to change during operation. A settable real time clock 13 is used to  
8 keep time in the thermostat to facilitate diverse operations, such as different temperature set  
9 points (desired temperatures), during different periods of the day cycle. An analog-to-digital  
10 converter 27 (which may not be required in all systems) serves to convert any analog information  
11 received by the I/O unit 10 to digital information which is suitable for use by the CPU 9.

12 Temperature information from the sensor 5 and output signals to a space conditioning  
13 (heating and/or cooling) unit 3 pass through the I/O unit 10 under control of the CPU 9. Those  
14 skilled in the art will understand that if the correspondents external to the processor 1  
15 communicating with the CPU 9 are all digital in nature (e.g., if the temperature sensor 5  
16 incorporates its own analog-to-digital converter and sends a digital representation of temperature  
17 to the processor 1), then the I/O unit 10 may only constitute simple switching circuits.

18 Thus, in the usual manner during normal operation, the temperature sensor 5 sends an  
19 electrical signal (e.g., if the sensor 5 is a simple thermistor, a resistance value; several types of  
20 temperature sensors are widely used) representative of the temperature within the conditioned  
21 space 4 which the processor can compare against a previously entered set point to determine if  
22 control signals need to be sent to the space conditioning equipment 3. For example, if the  
23 temperature in the conditioned space 4 is found to be too low when operation is in the heating

1 mode, the processor 1 signals the space conditioning equipment 3 to circulate, through ducts 6, 7,  
2 air from/to the conditioned space 4 which is heated by the space conditioning equipment before  
3 return to the conditioned space. This heating phase continues until the sensor 5 indicates that the  
4 space is now too hot (or approaching too hot) with reference to the current set point such that the  
5 processor 1 sends signal(s) to the space conditioning equipment 3 to cease the heating function,  
6 all as very well known in the art. In a cooling mode, a counterpart procedure is followed. Those  
7 skilled in the art will understand that the control process typically includes such refinements as  
8 anticipation, hysteresis accommodation, fan control, etc. which are acknowledged, but are not  
9 directly relevant to the invention.

10 In accordance with the prior art, power to the processor 1 is conventionally supplied from  
11 the space conditioning equipment 3 via a line 30 through an isolation diode 33. In the event of a  
12 power outage, power is supplied from a backup battery 31 (or a very high capacity capacitor  
13 “supercap” 32) to “ride out” equipment power failure until power is restored. However, these are  
14 not fail safe expedients. Batteries must be changed at intervals (and often are not) to ensure that  
15 the thermostat (or at least the clock) will continue to operate during a power failure. Supercaps  
16 are susceptible to developing leakage which greatly diminish their charge-storing capacity; i.e.,  
17 they may develop a resistance across the plates sufficiently low that a charge stored during  
18 normal operation discharges during an outage before power is restored.

19 Attention is now directed to FIG. 2 which is a block diagram of the clock 13, modified  
20 according to a first exemplary embodiment of the invention, and the components with which it  
21 communicates. As previously described, the clock 13 provides real time information to the CPU  
22 9 to facilitate the timely institution of or stopping of diverse operations. The clock 13, in  
23 accordance with the present invention includes a real time clock module 30 which is an off-the-

1 shelf integrated circuit component and a small non-volatile random access memory (RAM) 31,  
2 such as a flash RAM or electrically eraseable random access memory (eeprom). Such memories,  
3 of which there are various types, are characterized in that they will hold their contents  
4 indefinitely upon a power failure, but may, during normal operation, be rewritten essentially  
5 limitlessly in the same manner as a volatile RAM which, however, does lose its contents as a  
6 result of a power loss. It may be noted, as represented by the dashed communication line 33,  
7 that, in practicing the invention, the memory 8 may include a non-volatile RAM section 32 which  
8 eliminates the need for the separate non-volatile RAM 33. As a practical matter, as the state of  
9 the art of circuit integration progresses, most or all the components of a programmable  
10 thermostat according to the invention may be incorporated as a single configurable and  
11 programmable integrated circuit or in a very few chips.

12 The thermostat, including the real time clock 30, is normally conventionally powered, via  
13 line 35 and an isolation diode 36, from the equipment to which the thermostat is connected.  
14 However, it is a feature of the invention that no source of backup power, such as a battery or  
15 supercap, is required.

16 Referring also now to the process flow chart of FIG. 3, the relevant portion of the control  
17 program normally running in the CPU 9 is described. In accordance with the invention, at some  
18 suitable point in the loop of the control program, an inquiry is made (step 40) as to whether a  
19 predetermined period since the time and date information in the real time clock 30 were last  
20 stored has been exceeded. (Merely by way of example, the predetermined period might be one  
21 hour, but it could be as often as every time the control program runs through the routine shown in  
22 FIG. 3 which would eliminate the need for step 40.) If not, the control program continues.

1 However, if the predetermined period has been exceeded, the stored time and date is updated  
2 (step 41) from the real time clock before continuing the control program.

3 Referring now to FIG. 4, it will be seen that, in the event of a power failure and then a  
4 restart after power has been restored, the restart procedure of the control program includes  
5 resetting the real time clock from the time and date value stored in the non-volatile RAM 31.  
6 Accordingly, the time and date will be off no more than the period of the outage plus the period  
7 since the time and date were last updated before the outage as described above. Most outages are  
8 relatively short term, a few minutes to perhaps an hour, such that it will be apparent that a restart  
9 with a time and date resident in the real time clock which is only this limited amount slow will  
10 permit resumption of operation with little problem. As previously mentioned, this is of particular  
11 importance when the thermostat is operating in the vacation mode.

12 FIG. 5 illustrates a second exemplary embodiment of the invention. In this embodiment,  
13 a wireless receiver 50 is tuned to a source of precision time such as WWVB which operates at 60  
14 khz. Such receivers are well known in the art and may be implemented in small integrated  
15 circuits which can readily be incorporated into a thermostat. For example, a single chip WWVB  
16 receiver is available from Micro Analog Systems of Espoo, Finland, and is designated by part  
17 number MAS9178 in data sheet DA9178.000. The output from the receiver 50 is a once per  
18 second data set of the exact time (which can be adjusted to a time zone) and date. This  
19 information is used to periodically update the time and date information running in the real time  
20 clock 30.

21 It will now be understood that the embodiment of the invention shown in FIG. 5 will  
22 normally keep, and resume after an outage, precision time from a suitable source such as  
23 WWVB. In addition, if WWVB is not being received (because it is off the air, there is

1 interference, etc.), then the clock is still fail safe because this embodiment will then operate in  
2 the manner of the embodiment shown in FIG. 2 and the process flow charts of FIGs. 3 and 4.

3 While a wireless source of precision time has been discussed, it should be noted that  
4 precision time (from, for example, the National Institute of Standards and Technology) is also  
5 available on the Internet such that it is contemplated that the source 50 can receive its time  
6 signals via that medium.

7 In another embodiment of the invention, for use in areas where the wireless reception of  
8 time and date signals is reliable (or when the Internet, now very reliable, is used as the  
9 communications medium), then the non-volatile RAM 31 may be omitted and the sub-processes  
10 shown in FIGs. 3 and 4 need not be carried out. Rather, the real time clock 30 will be constantly  
11 (or as often as desired) updated from the external precision time source and, in the event of an  
12 outage and restart, the real time clock 30 will be promptly accurately set.

13 Thus, while the principles of the invention have now been made clear in an illustrative  
14 embodiment, there will be immediately obvious to those skilled in the art many modifications of  
15 structure, arrangements, proportions, the elements, materials, and components, used in the  
16 practice of the invention which are particularly adapted for specific environments and operating  
17 requirements without departing from those principles.

WHAT IS CLAIMED IS:

- 1 1. A programmable thermostat for controlling space conditioning equipment comprising:
  - 2 A) means coupling suitable power for energizing said thermostat from said space
  - 3 conditioning equipment to said thermostat;
  - 4 B) an interactive interface for a user to enter programming information into said
  - 5 thermostat;
  - 6 C) a temperature sensor for providing an electrical signal indicative of the
  - 7 temperature of a conditioned space in which the temperature sensor is situated;
  - 8 D) a processor, said processor including:
    - 9 1) a central processing unit;
    - 10 2) a first memory coupled to said central processing unit for storing program
    - 11 and data information; and
    - 12 3) an input/output unit including:
      - 13 a) a sensor input coupled to said temperature sensor for receiving
      - 14 said electrical signal therefrom; and
      - 15 b) a control output coupled to the space conditioning equipment for
      - 16 issuing control signals thereto;
    - 17 4) a real time clock;
    - 18 5) a non-volatile random access memory; and
    - 19 6) a control program stored in said first memory directing:
      - 20 a) said real time clock to periodically read its current time and date
      - 21 information into said non-volatile memory; and

22                               b) upon restart after a loss and then return of power from said space  
23                               conditioning equipment, read the time and date information stored in  
24                               said non-volatile memory into said real time clock.

1    2. The thermostat of Claim 1 in which said non-volatile random access memory is  
2    included in said first memory.

1    3. The thermostat of Claim 1 which includes a vacation mode of operation.

1    4. The thermostat of Claim 2 which includes a vacation mode of operation.

1    5. The thermostat of Claim 1 which further includes a receiver adapted to receive current  
2    time and date information from an external source of the current time and date, said  
3    receiver being coupled to said real time clock such that the time and date information  
4    thereof is updated from said receiver.

1    6. The thermostat of Claim 5 in which said receiver receives wireless signals from said  
2    external source.

1    7. The thermostat of Claim 5 in which said receiver receives signals via the Internet from  
2    said external source.

1    8. The thermostat of Claim 5 which includes a vacation mode of operation.

1 9. The thermostat of Claim 6 which includes a vacation mode of operation.

1 10. The thermostat of Claim 7 which includes a vacation mode of operation.

1 11. A programmable thermostat for controlling space conditioning equipment comprising:

2 A) means coupling suitable power for energizing said thermostat from said space  
3 conditioning equipment to said thermostat;

4 B) an interactive interface for a user to enter programming information into said  
5 thermostat;

6 C) a temperature sensor for providing an electrical signal indicative of the  
7 temperature of a conditioned space in which the temperature sensor is situated;

8 D) a processor, said processor including:

9 1) a central processing unit;

10 2) a first memory coupled to said central processing unit for storing program  
11 and data information; and

12 3) an input/output unit including:

13 a) a sensor input coupled to said temperature sensor for receiving  
14 said electrical signal therefrom; and

15 b) a control output coupled to the space conditioning equipment for  
16 issuing control signals thereto;

17 4) a real time clock; and

18                    5) a receiver adapted to receive current time and date information from an  
19                    external source of the current time and date, said receiver being coupled to  
20                    said real time clock such that the time and date information thereof is  
21                    updated from said receiver.

1    12. The thermostat of Claim 11 in which said receiver receives wireless signals from said  
2    external source.

1    13. The thermostat of Claim 11 in which said receiver receives signals via the Internet  
2    from said external source.

1    \

1    14. The thermostat of Claim 11 which includes a vacation mode of operation.

1

1    15. The thermostat of Claim 12 which includes a vacation mode of operation.

1

1    16. The thermostat of Claim 13 which includes a vacation mode of operation.

1 ABSTRACT OF THE DISCLOSURE

2 A programmable thermostat for controlling space conditioning equipment receives  
3 power from the equipment. The thermostat has an interactive interface for user  
4 programming, a temperature sensor and a processor including: a central processing unit; a  
5 memory for storing program and data information, a real time clock and a non volatile  
6 random access memory. A control program stored in the memory causes the real time  
7 clock to periodically read its current time and date information into the non-volatile RAM.  
8 Upon restart after an outage, the time and date information stored in the non-volatile RAM  
9 is read into the real time clock to provide an acceptable time and date basis for resuming  
10 operation. Accordingly, the need for providing a backup power source, such as a battery or  
11 a supercap, is eliminated. In one exemplary embodiment, the thermostat also includes a  
12 receiver for accessing precision time and date signals from, for example, WWVB. The  
13 output of the receiver is used to periodically update the time and date in the real time clock  
14 such that, even after an outage, the real time clock will be accurate. If the receiver is not  
15 operating for some reason after an outage, then the real time clock will still be set from the  
16 non-volatile RAM.

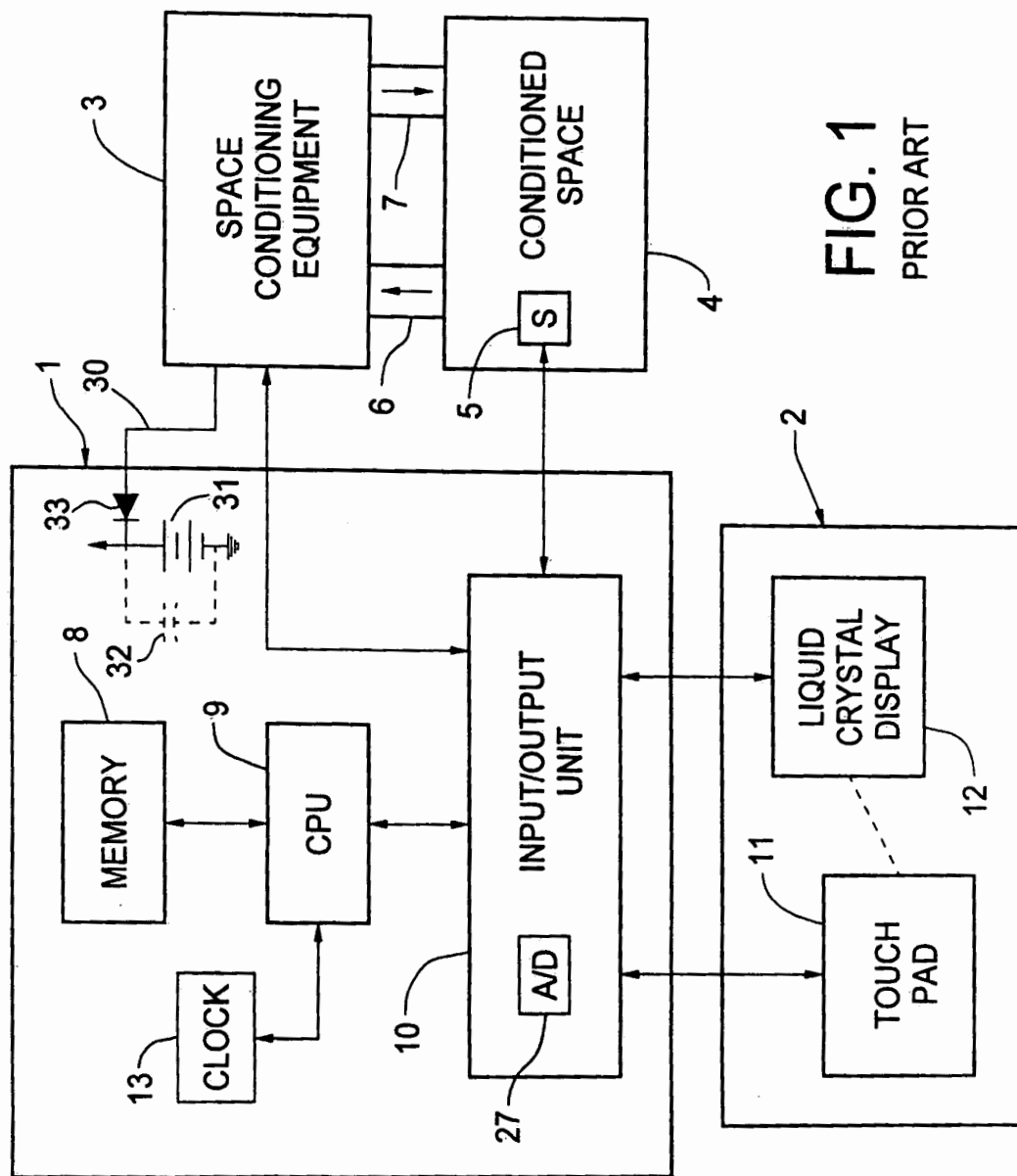


**FIG. 1**  
PRIOR ART

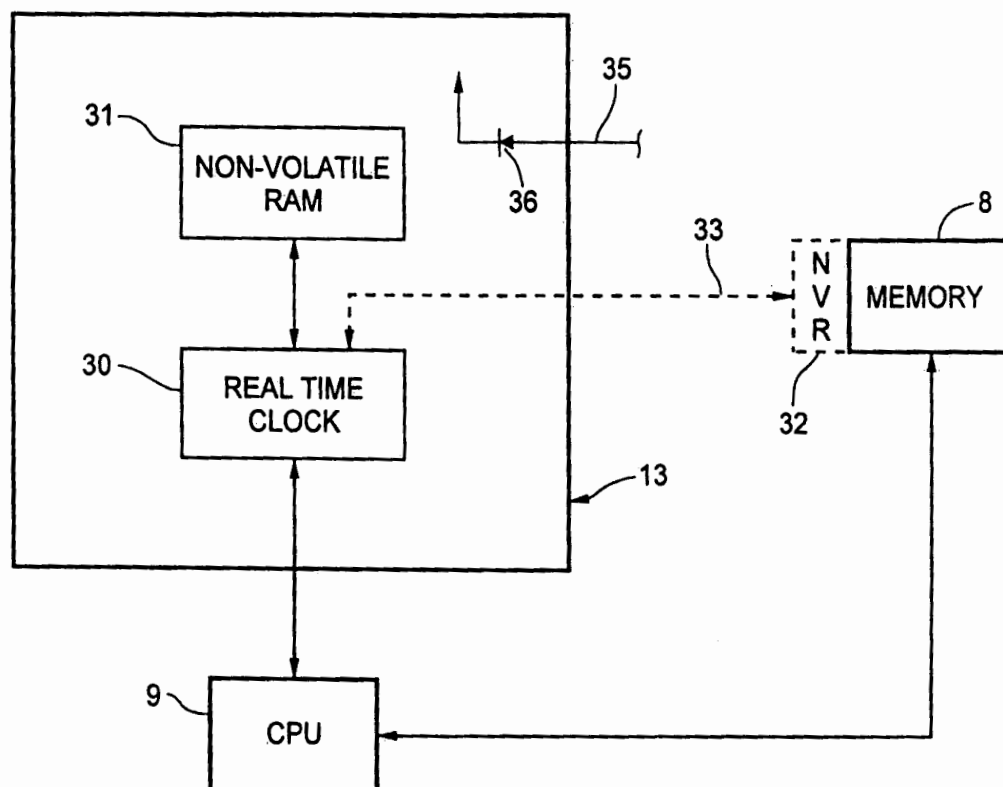


FIG. 2

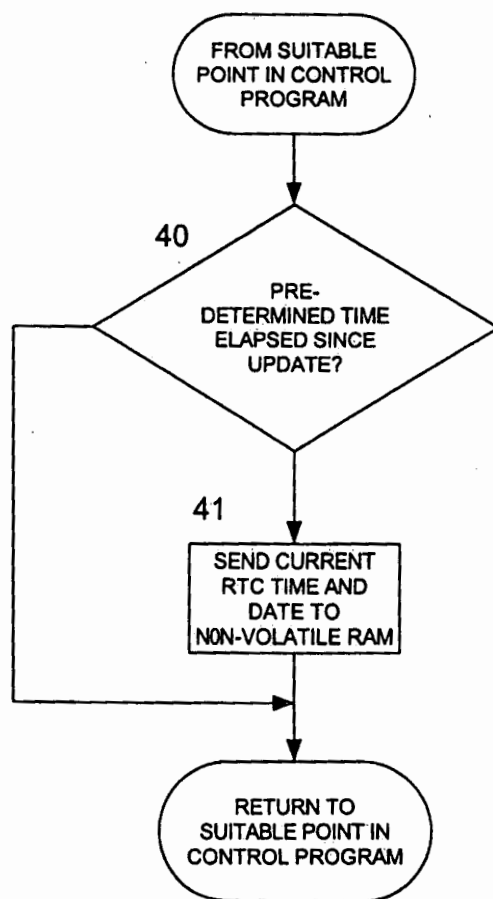


FIG. 3

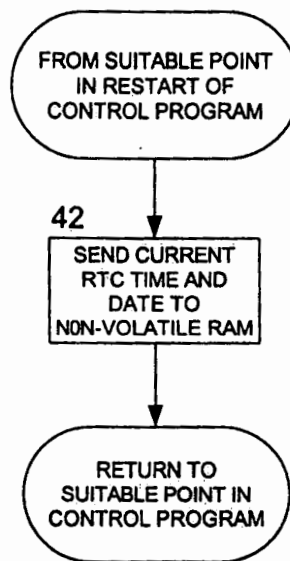


FIG. 4

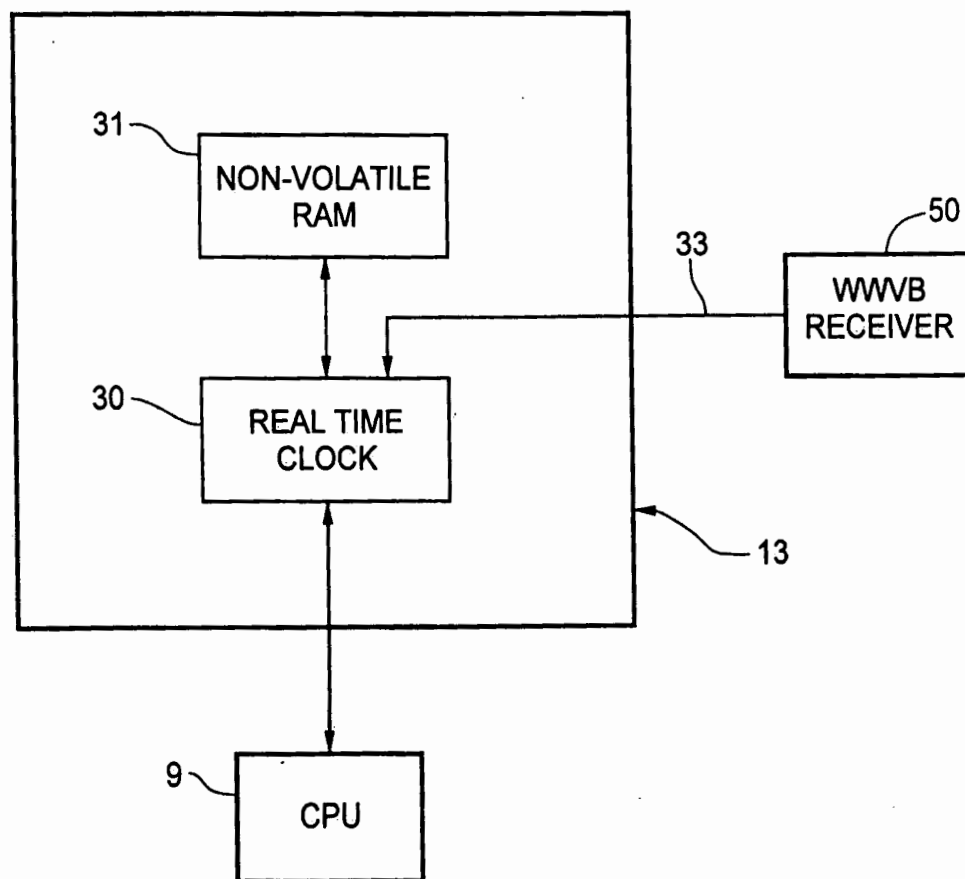


FIG. 5

# IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Title: PROGRAMMABLE THERMOSTAT  
EMPLOYING A FAIL SAFE REAL TIME  
CLOCK

Inventor(s): Howard Rosen

Assignee:

Serial No.:

Filing Date:

Group No.:

Examiner:

Attorney Docket No.: 0404.2A4

DECLARATION / POWER OF  
ATTORNEY

As above-named inventor(s), I (we) hereby declare that:

1. My residence and citizenship are as stated by my name.

|                        |                                                                 |              |
|------------------------|-----------------------------------------------------------------|--------------|
| Full Name of Inventor: |                                                                 | Citizenship: |
| #1 Howard Rosen        | Address #1: Lyncroft Road, Hampstead,<br>Quebec, H3X 3E3 Canada | Canada       |

I (we) further declare that:

2. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention identified above and is attached hereto.
3. I have reviewed and understand the contents of the above identified specification, claims, drawings and abstract and acknowledge my duty to disclose information which is material to the examination of this application in accordance with Title 37 Code of Federal Regulations §1.56.
4. The inventor(s) named below does (do) hereby appoint as attorney of record with full power of substitution and revocation, to prosecute the above application and transact all business in the Patent and Trademark Office connected therewith.: 1. David T. Bracken, Registration No. 37,522; Send correspondence to: David T. Bracken, The Law Office of David T. Bracken, 4839 East Bond Avenue, Orange, California 92869
5. All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. All the above statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 the United States Code, and such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

|                        |                                                                                      |           |
|------------------------|--------------------------------------------------------------------------------------|-----------|
| Full Name of Inventor: | Signature of Inventor:                                                               | Date:     |
| #1 Howard Rosen        |  | 6/23/2004 |

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Title: PROGRAMMABLE THERMOSTAT  
EMPLOYING A FAIL SAFE REAL  
TIME CLOCK

Inventor(s): Howard Rosen

Assignee:

Serial No.:

Filing Date:

Group No.:

Examiner:

Attorney Docket No.: 0404.2A4

INFORMATION DISCLOSURE  
STATEMENT - REMARKS

COMMISSIONER FOR PATENTS

Sir:

In accordance with the duty of disclosure under 37 C.F.R. 1.56 and pursuant to 37 C.F.R. 1.97-1.98, Applicant hereby notifies the U.S. Patent and Trademark Office of the documents listed on the attached Form PTO-SB-08A. One copy of the cited document is submitted herewith.

The submission of the listed documents is not intended as an admission that any such document constitutes prior art against the claims of the present application. Applicant reserves the right to dispute any of the listed documents as prior art during examination. Further, Applicant does not waive any right to take any action that would be appropriate to antedate or otherwise remove any listed document as a competent reference against the claims of the present application. Furthermore, the submission of this Information Disclosure Statement is not to be construed as a representation that a search has been made or that no other material information may exist. Applicant respectfully submits that all pending claims are patentable over the foregoing references, alone or in combination.

US Patent 5170935 is directed to a system for a human to thermostat interface where a thermostat learns to compare presently input thermal sensations with calculated anticipatory parameters stored in the thermostat. Input means are described for touch screens.

US Patent 4224615 discloses a generalized form of a touch screen for user input.

US Patent 5818428 describes a touch screen for a PC or home appliance that can be changed in appearance after purchase by a user to make the interface more acceptable to the user.

US Patent 6344861 discloses that a handheld device such as a PDA may be used wirelessly to form an interface with a thermostat.

The references do not disclose a method for using different touch screen displays which represent subsequent menu or sub listed functions accessible through a touch screen display in a thermostat.

Respectfully submitted,

Dated: June 24, 2004

*David T. Bracken*

David T. Bracken

Registration No. 37,522

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U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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|                                                                                                                                               |   |    |   | Application Number       |          |
|                                                                                                                                               |   |    |   | Filing Date              |          |
|                                                                                                                                               |   |    |   | First Named Inventor     | ROSEN    |
|                                                                                                                                               |   |    |   | Group Art Unit           |          |
|                                                                                                                                               |   |    |   | Examiner Name            |          |
| Sheet                                                                                                                                         | 1 | of | 1 | Attorney Docket Number   | 0404.2A4 |

[illegible][illegible]

|                       |  |                    |  |
|-----------------------|--|--------------------|--|
| Examiner<br>Signature |  | Date<br>Considered |  |
|-----------------------|--|--------------------|--|

<sup>1</sup> Unique citation designation number. <sup>2</sup> See attached Kinds of U.S. Patent Documents. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup> Applicant is to place a check mark here if English language Translation is attached.

**Burden Hour Statement:** This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U. S. Patent and Trademark Office, Washington, DC 20231. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO:** Assistant Commissioner for Patents, Washington, DC 20231.

# PATENT APPLICATION FEE DETERMINATION RECORD

Effective October 1, 2003

Application or Docket Number

10375579

## CLAIMS AS FILED - PART I

|                                                           | (Column 1)      | (Column 2)   |
|-----------------------------------------------------------|-----------------|--------------|
| TOTAL CLAIMS                                              |                 |              |
| FOR                                                       | NUMBER FILED    | NUMBER EXTRA |
| TOTAL CHARGEABLE CLAIMS                                   | 16 minus 20 = * |              |
| INDEPENDENT CLAIMS                                        | 2 minus 3 = *   |              |
| MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/> |                 |              |

\* If the difference in column 1 is less than zero, enter "0" in column 2

## CLAIMS AS AMENDED - PART II

|                                                                         | (Column 1)                       | (Column 2)                         | (Column 3)    |
|-------------------------------------------------------------------------|----------------------------------|------------------------------------|---------------|
| AMENDMENT A                                                             | CLAIMS REMAINING AFTER AMENDMENT | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA |
| Total                                                                   | *                                | Minus                              | **            |
| Independent                                                             | *                                | Minus                              | ***           |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/> |                                  |                                    |               |

|                                                                         | (Column 1)                       | (Column 2)                         | (Column 3)    |
|-------------------------------------------------------------------------|----------------------------------|------------------------------------|---------------|
| AMENDMENT B                                                             | CLAIMS REMAINING AFTER AMENDMENT | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA |
| Total                                                                   | *                                | Minus                              | **            |
| Independent                                                             | *                                | Minus                              | ***           |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/> |                                  |                                    |               |

|                                                                         | (Column 1)                       | (Column 2)                         | (Column 3)    |
|-------------------------------------------------------------------------|----------------------------------|------------------------------------|---------------|
| AMENDMENT C                                                             | CLAIMS REMAINING AFTER AMENDMENT | HIGHEST NUMBER PREVIOUSLY PAID FOR | PRESENT EXTRA |
| Total                                                                   | *                                | Minus                              | **            |
| Independent                                                             | *                                | Minus                              | ***           |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/> |                                  |                                    |               |

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."

\*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

SMALL ENTITY TYPE ☐

OR

OTHER THAN SMALL ENTITY

| RATE      | FEE    |
|-----------|--------|
| BASIC FEE | 385.00 |
| X\$ 9=    |        |
| X43=      |        |
| +145=     |        |
| TOTAL     | 385    |

| RATE      | FEE    |
|-----------|--------|
| BASIC FEE | 770.00 |
| X\$18=    |        |
| X86=      |        |
| +290=     |        |
| TOTAL     |        |

SMALL ENTITY

OR

OTHER THAN SMALL ENTITY

| RATE             | ADDITIONAL FEE |
|------------------|----------------|
| X\$ 9=           |                |
| X43=             |                |
| +145=            |                |
| TOTAL ADDIT. FEE |                |

OR

| RATE             | ADDITIONAL FEE |
|------------------|----------------|
| X\$18=           |                |
| X86=             |                |
| +290=            |                |
| TOTAL ADDIT. FEE |                |

| RATE             | ADDITIONAL FEE |
|------------------|----------------|
| X\$ 9=           |                |
| X43=             |                |
| +145=            |                |
| TOTAL ADDIT. FEE |                |

OR

| RATE             | ADDITIONAL FEE |
|------------------|----------------|
| X\$18=           |                |
| X86=             |                |
| +290=            |                |
| TOTAL ADDIT. FEE |                |

| RATE             | ADDITIONAL FEE |
|------------------|----------------|
| X\$ 9=           |                |
| X43=             |                |
| +145=            |                |
| TOTAL ADDIT. FEE |                |

OR

| RATE             | ADDITIONAL FEE |
|------------------|----------------|
| X\$18=           |                |
| X86=             |                |
| +290=            |                |
| TOTAL ADDIT. FEE |                |

PATENT APPLICATION SERIAL NO. \_\_\_\_\_

U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE  
FEE RECORD SHEET

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