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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/069,378	04/24/2007	7207181		9778

23121 7590 04/04/2007
THE LAW FIRM OF HARRIS & BURDICK
HAROLD BURDICK AND ROBERT HARRIS
6676 GUNPARK DRIVE
SUITE E
BOULDER, CO 80301

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 129 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):

Brent W. Murray, Longmont, CO;
Patrick M. Bertsch, Thornton, CO;
Robert A. Majzner, Broomfield, CO;



PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: MailMail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. Further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

23121

7590

12/14/2006

THE LAW FIRM OF HARRIS & BURDICK
HAROLD BURDICK AND ROBERT HARRIS
6676 GUNPARK DRIVE
SUITE E
BOULDER, CO 80301

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.

Harold A. Burdick	(Depositor's name)
<i>[Signature]</i>	(Signature)
3-13-07	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/069,378	03/01/2005	Brent W. Murray		9778

TITLE OF INVENTION: REFRIGERATION UNIT CONDENSATION PREVENTION

03/15/2007 HNGUYEN2 00000047 11869378

01 FC:2501

780.00 OP

02 FC:1504

300.00 OP

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$0	\$1000	03/14/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
TAPOLCAI, WILLIAM E	3744	062-150000

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 Harold A. Burdick

2

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)

Bradley W. Geuke

Ault, Colorado

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 _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☒ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ 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

[Signature]

Date March 13, 2007

Typed or printed name Harold A. Burdick

Registration No. 32,725

This collection of information is required by 37 CFR 1.311. 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 1.14. This collection is estimated to take 12 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Murray et al.
Serial Number : 11/069,378
Filing Date : March 1, 2005
For : REFRIGERATION UNIT
CONDENSATION PREVENTION
Group Art Unit : 3744
Examiner : Tapolcai, William E.

ISSUE AND PUBLICATION FEES TRANSMITTAL

Certificate of Mailing

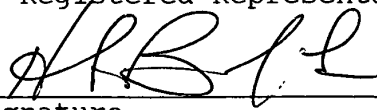
The Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Issue Fee, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on March 13, 2007.

Harold A. Burdick

Name of Applicant, Assignee
or Registered Representative


Signature

3-13-07
Date



PATENT

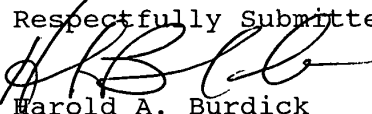
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Murray et al.
Serial Number : 11/069,378
Filing Date : March 1, 2005
For : REFRIGERATION UNIT
CONDENSATION PREVENTION
Group Art Unit : 3744
Examiner : Tapolcai, William E.

ISSUE AND PUBLICATION FEES TRANSMITTAL

Enclosed is Form PTOL-85 (Fees Transmittal) together with our check number 1095 in the amount of \$1,000.00 to cover the issue and publication fees with respect to the above-identified U.S. Patent Application.

Respectfully Submitted,


Harold A. Burdick
Registration No. 32,725

HAB
Telephone: (303) 530-1355

FORM PTO-146
REV. 7-99

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

ATTY. COUNSEL NO. 11/069,378

APPLICANT
MUSEY et al.
FILING DATE
March 1, 2005

CLASS
3634 (Preliminary)

LIST OF PRIOR ART CITED BY APPLICANT
(One reveal sheet if necessary)

U.S. PATENT DOCUMENTS

SEQUENCE NUMBER	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
WE	6470696	3/18/04	Polsy et al.			
WE	6470696	10/02	Polsy et al.			
WE	5778689	7/98	Beatenbough			
WE	5778689	7/98	Klm			
WE	4127765	11/78	Heaney			
WE	6350261	4/03	Shinn et al.			
WE	589078	5/99	Hager			
WE	3939666	2/76	Reuback			
AI						
AJ						
AK						

FOREIGN PATENT DOCUMENTS

SEQUENCE NUMBER	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
AL						
AM						
AN						
AO						
AP						

OTHER PRIOR ART (including Author, Title, Date, Pertinent Pages, Etc.)

WE	Door Kliner Model XP; Door Kliner LLP; Advertising Flyer; Publication date unknown.
WE	Save Money by Taking Control; Door Kliner LLP; WWW.DoorKliner.com; Advertising Flyer; Publication Date Unknown.
WE	New Door Kliner XP; Pages 1-5 from WWW.DoorKliner.com; Publication Date Unknown.

EXAMINER
DATE CONSIDERED
8/31/06

*EXAMINER: Initial if reference considered, whether or not citation is in compliance with 37 CFR 409. Once line through citation it not be considered and not considered. Include copy of this form with next communication to applicant.

USCOM-DC 99-3003

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/069,378	03/01/2005	Brent W. Murray		9778

23121 7590 01/22/2007
THE LAW FIRM OF HARRIS & BURDICK
HAROLD BURDICK AND ROBERT HARRIS
6676 GUNPARK DRIVE
SUITE E
BOULDER, CO 80301

EXAMINER

TAPOLCAI, WILLIAM E

ART UNIT	PAPER NUMBER
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3744

MAIL DATE	DELIVERY MODE
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01/22/2007

PAPER

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

**Supplemental
Notice of Allowability**

Application No.

11/069,378

Examiner

William E. Tapolcai

Applicant(s)

MURRAY ET AL.

Art Unit

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 ____.
2. ☒ The allowed claim(s) is/are 1-13 and 21-27.
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. ☐ Notice of References Cited (PTO-892) | 5. ☐ Notice of Informal Patent Application |
| 2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948) | 6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date ____. |
| 3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date ____ | 7. ☐ Examiner's Amendment/Comment |
| 4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. ☐ Examiner's Statement of Reasons for Allowance |
| | 9. ☐ Other ____. |


William E. Tapolcai
Primary Examiner
Art Unit: 3744



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/069,378	03/01/2005	Brent W. Murray		9778

EXAMINER	
TAPOLCAI, WILLIAM E	

ART UNIT	PAPER NUMBER
3744	

MAIL DATE	DELIVERY MODE
01/22/2007	PAPER

23121 7590 01/22/2007
THE LAW FIRM OF HARRIS & BURDICK
HAROLD BURDICK AND ROBERT HARRIS
6676 GUNPARK DRIVE
SUITE E
BOULDER, CO 80301

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

Supplemental Notice of Allowability	Application No. 11/069,378		Applicant(s) MURRAY ET AL.	
	Examiner William E. Tapolcai		Art Unit 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 the amendment filed on November 6, 2006.

2. ☒ The allowed claim(s) is/are 1-13 and 21-27.

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.
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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.

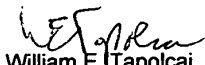
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 (b) ☐ including changes required by the attached Examiner's Amendment / Comment 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).

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Attachment(s)

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


 William E. Tapolcai
 Primary Examiner
 Art Unit: 3744



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NOTICE OF ALLOWANCE AND FEE(S) DUE

23121 7590 12/14/2006

THE LAW FIRM OF HARRIS & BURDICK
HAROLD BURDICK AND ROBERT HARRIS
6676 GUNPARK DRIVE
SUITE E
BOULDER, CO 80301

EXAMINER

TAPOLCAI, WILLIAM E

ART UNIT

PAPER NUMBER

3744

DATE MAILED: 12/14/2006

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/069,378	03/01/2005	Brent W. Murray		9778
TITLE OF INVENTION: REFRIGERATION UNIT CONDENSATION PREVENTION				

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$0	\$1000	03/14/2007

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.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

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.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

23121 7590 12/14/2006

**THE LAW FIRM OF HARRIS & BURDICK
HAROLD BURDICK AND ROBERT HARRIS
6676 GUNPARK DRIVE
SUITE E
BOULDER, CO 80301**

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Certificate of Mailing or Transmission

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/069,378	03/01/2005	Brent W. Murray		9778

TITLE OF INVENTION: REFRIGERATION UNIT CONDENSATION PREVENTION

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$0	\$1000	03/14/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
TAPOLCAI, WILLIAM E	3744	062-150000

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.

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 _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ 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 _____

Typed or printed name _____

Registration No. _____

This collection of information is required by 37 CFR 1.311. 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 1.14. This collection is estimated to take 12 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/069,378	03/01/2005	Brent W. Murray		9778
23121	7590	12/14/2006		

THE LAW FIRM OF HARRIS & BURDICK
HAROLD BURDICK AND ROBERT HARRIS
6676 GUNPARK DRIVE
SUITE E
BOULDER, CO 80301

EXAMINER	
TAPOLCAI, WILLIAM E	
ART UNIT	PAPER NUMBER
3744	

DATE MAILED: 12/14/2006

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 130 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 130 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.

NT

Notice of Allowability	Application No.	Applicant(s)	
	11/069,378	MURRAY ET AL.	
	Examiner	Art Unit	
	William E. Tapolcai	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 the amendment filed on November 6, 2006.
2. ☒ The allowed claim(s) is/are 1-13, 17 and 21.
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. ☒ Notice of References Cited (PTO-892) | 5. ☐ Notice of Informal Patent Application |
| 2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>20050602</u> | 7. ☐ Examiner's Amendment/Comment |
| 4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. ☒ Examiner's Statement of Reasons for Allowance |
| | 9. ☐ Other _____ |

William E. Tapolcai
 Primary Examiner
 Art Unit: 3744

1. The following is an examiner's statement of reasons for allowance: the claims are allowable because the prior art of record fails to disclose or teach the recited display case having a door and door frame with a heater therefor, a temperature sensing unit in contact with the door frame, a dew point sensing unit on the display case to monitor the ambient temperature and humidity, and control means for receiving data from the two sensing units to operate the heater.

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."

2. The drawings filed on November 6, 2006 are acceptable.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William E. Tapolcai whose telephone number is (571) 272-4814. The examiner can normally be reached on Mon. - Thurs., 6:30 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl J. 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). 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.


William E. Tapolcai
Primary Examiner
Art Unit 3744

wet
November 20, 2006



FORM PTO-149 (REV. 7-01)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		Serial 1 of 1	
LIST OF PRIOR ART CITED BY APPLICANT (Use several sheets if necessary)		ATTY. DOCKET NO.		SERIAL NO.	
		MUEBY, et al.		11/069,378	
		FILING DATE		GROUP	
		March 1, 2005		3634 (Preliminary)	
U.S. PATENT DOCUMENTS					
EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS
WE	US 04 05 072 A1	3/18/04	Palfy et al.		
WE	6 4 7 0 6 9 6	10/02	Palfy et al.		
WE	5 7 7 8 6 8 9	7/98	Beatenbough		
WE	5 7 7 8 1 4 7	7/98	Kim		
WE	4 1 2 7 7 6 5	11/78	Heaney		
WE	6 5 5 0 2 6 1	4/03	Shima et al.		
WE	5 8 9 9 0 7 8	5/99	Hager		
WE	3 9 3 9 6 6 6	2/76	Bashark		
	AI				
	AJ				
	AK				
FOREIGN PATENT DOCUMENTS					
	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS
AL					
AM					
AN					
AO					
AP					
OTHER PRIOR ART (including Author, Title, Date, Perinent Pages, Etc.)					
AR	Door Miser Model XP; Door Miser LLP; Advertising Flyer; Publication date unknown.				
AS	Solve Money by Taking Control; Door Miser LLP; WM.Doomiser.com; Advertising Flyer; Publication Date unknown.				
AT	New Door Miser XP; Pages 1-5 from WM.Doomiser.com; Publication Date Unknown.				
EXAMINER	DATE CONSIDERED				
WE	8/31/06				
*EXAMINER: Initial if reference considered, whether or not citation is in conference with MPEP 609; Draw line through citation if not in conference and not considered. Include copy of this form with next communication to applicant.					

Notice of References Cited	Application/Control No. 11/069,378	Applicant(s)/Patent Under Reexamination MURRAY ET AL.	
	Examiner William E. Tapolcai	Art Unit 3744	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-4,862,701	09-1989	Small et al.	62/150
*	B	US-4,261,179	04-1981	Dageford, Ernest	62/150
*	C	US-6,301,913	10-2001	Schulak et al.	62/248
	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 Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	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.

Search Notes

Application/Control No.

11/069,378

Examiner

William E. Tapolcai

Applicant(s)/Patent under
Reexamination

MURRAY ET AL.

Art Unit

3744

SEARCHED

Class	Subclass	Date	Examiner
62	150 176.2 176.6 248 275	11/20/2006	WET

INTERFERENCE SEARCHED

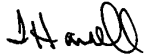
Class	Subclass	Date	Examiner
62	246-256	11/20/2006	WET

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR
EAST	11/20/2006	WET
EAST inventor name search	11/20/2006	WET
EAST interference search	11/20/2006	WET

Issue Classification 	Application/Control No.	Applicant(s)/Patent under Reexamination	
	11/069,378	MURRAY ET AL.	
	Examiner	Art Unit	
	William E. Tapolcai	3744	

ISSUE CLASSIFICATION									
ORIGINAL				CROSS REFERENCE(S)					
CLASS		SUBCLASS		CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
62		150		62	176.6	248	275		
INTERNATIONAL CLASSIFICATION									
A	4	7	F						
				3/04					
				/					
				/					
				/					
				/					

(Assistant Examiner) (Date)		 William E. Tapolcai 11/20/2006 (Primary Examiner) (Date)		Total Claims Allowed: 20	
 (Legal Instruments Examiner) (Date)				O.G. Print Claim(s)	O.G. Print Fig.
				1	1

☐ Claims renumbered in the same order as presented by applicant				☐ CPA				☐ T.D.				☐ R.1.47			
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original		
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7	7		37		67		97		127		157		187		
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	29		59		89		119		149		179		209		
	30		60		90		120		150		180		210		

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L3	170	62/248.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 07:04
L4	390	62/275.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 07:04
L5	278	62/150.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 07:04
L6	28	62/176.2.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 07:04
L7	361	62/176.6.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 07:04
L8	8	I3 and I5	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 07:19
L9	0	I3 and I6	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 07:20
L10	0	I3 and I7	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 07:20
L11	21	I4 and I5	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 07:20
L12	19	I11 not I8	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 09:54
L13	1	I4 and I6	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 10:20

EAST Search History

L14	1	l4 and l7	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 10:21
L15	26	(electric adj heater) with (dew adj point)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 10:28
L16	6	(display adj case) with (electric adj heater)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 10:33
L17	1	(temperature adj sensor) near5 (door adj frame)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 10:35
L18	4	(temperature adj sensor) with (door adj frame)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 10:36
L19	10	(temperature adj sensor) same (door adj frame)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 10:36
L20	6	l19 not l18	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 10:41
L21	25	murray-brent-w.in.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2006/11/20 10:42
L22	6024	"62"/\$.ccls.	US-PGPUB	OR	OFF	2006/11/20 10:43
L23	2	((door adj frame) with heater and (dew adj point))	US-PGPUB	OR	OFF	2006/11/20 10:43



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
11/069,378	03/01/2005	3744	500		29	20	3

CONFIRMATION NO. 9778

23121
THE LAW FIRM OF HARRIS & BURDICK
HAROLD BURDICK AND ROBERT HARRIS
6676 GUNPARK DRIVE
SUITE E
BOULDER, CO80301

CORRECTED FILING RECEIPT

Date Mailed: 11/13/2006

Receipt is acknowledged of this regular Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please mail to the Commissioner for Patents P.O. Box 1450 Alexandria Va 22313-1450. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).**

Applicant(s)

Brent W. Murray, Longmont, CO;
Patrick M. Bertsch, Thornton, CO;
Robert A. Majzner, Broomfield, CO;

Assignment For Published Patent Application

Bradley W. Geuke

Power of Attorney:

Robert Harris--19493
Harold Burdick--32725

Domestic Priority data as claimed by applicant

Foreign Applications

If Required, Foreign Filing License Granted: 03/25/2005

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is
US11/069,378

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

Refrigeration unit condensation prevention

Preliminary Class

062

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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APPL NO.	FILING OR 371 (c) DATE	ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLMS	IND CLMS
11/069,378	03/01/2005	3634	500		29	20	3

23121
 THE LAW FIRM OF HARRIS & BURDICK
 HAROLD BURDICK AND ROBERT HARRIS
 6676 GUNPARK DRIVE
 SUITE E
 BOULDER, CO 80301

CONFIRMATION NO. 9778

FILING RECEIPT



OC000000015581464

Date Mailed: 03/28/2005

Receipt is acknowledged of this regular Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections, facsimile number 703-746-9195. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

Brent W. Murray, Longmont, CO;
 Patrick M. Bertsch, Thornton, CO;
 Robert A. Meizner, Broomfield, CO;
Meizner

Assignment For Published Patent Application

Bradley W. Geuke

Power of Attorney:

Robert Harris-19493
 Harold Burdick-32725

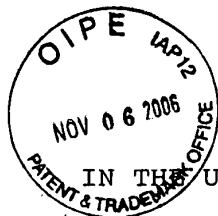
Domestic Priority data as claimed by applicant

Foreign Applications

If Required, Foreign Filing License Granted: 03/25/2005

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US11/069,378**

Projected Publication Date: 09/07/2006



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Murray et al.
Serial Number : 11/069,378
Filing Date : March 1, 2005
For : REFRIGERATION UNIT
PREVENTION CONDENSATION
Group Art Unit : 3744
Examiner : Tapolcai, William E.

ELECTION, PRELIMINARY AMENDMENT, TRANSMITTAL OF
REPLACEMENT (FORMAL) DRAWINGS, AND REQUEST FOR CORRECTION
OF FILING RECEIPT

ELECTION

Responsive to the Office Action of September 8,
2006, (the period for response to which has been extended
by request and fee submitted herewith) requiring
restriction to one of two Examiner identified inventions
for purposes continuing the Examination of the above-
identified patent application, Applicant herein elects
the invention of claims 1 through 13 (identified group I)
for examination, which election is made without traverse
of the requirement.

The claims added below by Amendment (after
cancellation of claims 14 through 20), are felt to fall

within the elected group and should now be examined with the elected claims 1 through 13.

A M E N D M E N T

After entry of the foregoing Election, please amend the above-identified Application as follows:

IN THE CLAIMS:

1. (Currently Amended) Condensation control apparatus for a refrigerated display case having at least one door, a frame and at least one frame/door heater, said apparatus comprising:

 a frame temperature sensing unit adapted for monitoring temperature of one of the display case door or display case frame and including a carrier having a temperature sensor thereat;

 a dew point sensing unit adapted for monitoring ambient air temperature and relative humidity outside of the display case and including a carrier having at least one dew point sensing component thereat;

 a control unit communicating ~~connected~~ with said sensing units and including processing means connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a preselected set point above a dew point value derived from monitored ambient temperature and relative humidity; and

 housing means for locating said sensing units including structure establishing thermal isolation of said sensing units by minimizing heat transfer contacts between said sensing units and said housing means and

locating said temperature sensor and said at least one dew point sensing component amid insulating air pockets formed by said structure of said housing means.

2. (Original) The apparatus of claim 1 wherein said housing means includes a frame temperature sensing unit housing, said frame temperature sensing unit housing including a base and a cover, said cover having a depth creating a first one of said air pockets at one side of said temperature sensing unit and said base including an opening for receiving said temperature sensor therethrough, said opening having an opening area greater than surface area of said temperature sensor thus establishing a second one of said air pockets around said temperature sensor.

3. (Original) The apparatus of claim 2 wherein said frame temperature sensing unit housing includes a single locating post at said cover for securing position of said temperature sensing unit relative to said cover.

4. (Original) The apparatus of claim 1 wherein said housing means includes a dew point sensing unit housing, said dew point sensing unit housing including a mounting base and cover, said cover including a cover face opening therethrough for receiving said at least one dew point sensing component therein, said cover face opening

including a protective shield thereover having air gaps therearound allowing air flow between said protective shield and said cover and thus over said at least one dew point sensing component.

5. (Original) The apparatus of claim 4 wherein said cover of said dew point sensing unit housing includes opposite end openings to establish ambient air flow through said dew point sensing unit housing.

6. (Original) The apparatus of claim 4 wherein said mounting base of said dew point sensing unit housing includes protrusions establishing retaining pockets receiving said carrier of said dew point sensing unit at outer edges of said carrier and further establishing a first one of said air pockets amid said protrusions and adjacent to said carrier.

7. (Original) The apparatus of claim 1 wherein said housing means includes a cover and a base, said cover including a cover face opening therethrough for receiving said at least one dew point sensing component therein, said cover face opening including a protective shield thereover having air gaps therearound allowing air flow between said protective shield and said cover and thus over said at least one dew point sensing component, and said base having depth creating a first one of said air

pockets at least at one side of said temperature sensing unit and a second one of said air pockets at one side of said dew point sensing unit.

8. (Original) A system for condensation control at an array of refrigerated display cases, the cases each having at least one door, a frame and at least one frame/door heater, said system comprising:

sensing and control apparatus configured for location at each display case in the array of display cases, said apparatus including a frame temperature sensing unit adapted for mounting at the display case for monitoring temperature of one of the display case door or display case frame, a dew point sensing unit adapted for mounting at the display case for monitoring ambient air temperature and relative humidity outside of the display case, an internal case temperature sensing unit positionable inside the display case, and processing means mountable at the display case and connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a first preselected set point above a dew point value derived from monitored ambient temperature and relative humidity, for deactivating the frame/door heater when monitored display case door or frame temperature

risers above a second preselected set point above said dew point value, and for storing data related to readings at said sensing units and operation of the frame/door heater; and

a communication control unit associated with said processing means for coordinating programming and data download access to said processing means of said apparatus.

9. (Original) The system of claim 8 further comprising a central processing unit and wherein said communication control unit includes a transmitter/receiver for wireless communication with said central processing unit.

10. (Original) The system of claim 8 wherein said processing means of said apparatus is separately housed in a housing having dimensions selected so that said housing is mountable between standard door frame mullions provided at the display case.

11. (Original) The system of claim 8 wherein said processing means of said apparatus includes a reset/programming interface.

12. (Original) The system of claim 8 wherein said frame temperature sensing unit and said dew point sensing unit are mounted together in a housing.

13. (Original) The system of claim 8 further comprising housing means for locating said temperature sensing unit and said dew point sensing unit and including structure establishing thermal isolation of said sensing units by minimizing heat transfer contacts between said temperature sensing unit and said dew point sensing unit and said housing means and locating said temperature sensing unit and said dew point sensing unit amid insulating air pockets formed by said structure of said housing means.

Cancel claims 14 through 20.

21. (New) A system for condensation control at a refrigerated display case having at least one door, a frame and at least one frame/door heater, said system comprising:

a temperature sensing unit in contact with the display case frame to monitor case frame temperature;

a dew point sensing unit on the display case to monitor ambient air temperature and relative humidity outside the display case; and

control means for receiving data from said sensing units and utilizing monitored case frame temperature, ambient air temperature and relative humidity to anticipate formation of condensation at the display case

and activating and deactivating the frame/door heater responsive thereto.

22. (New) The system of claim 21 further comprising means for thermally isolating said dew point sensing unit from variations in temperature of the display case frame or display case door.

23. (New) The system of claim 21 further comprising means for thermally isolating said temperature sensing unit from variations in temperature of ambient air.

24. (New) The system of claim 21 further comprising an internal case temperature sensing unit mounted inside the display case and communicating with said control means for monitoring internal case temperature.

25. (New) The system of claim 24 further comprising data storing means communicating with said control means for storing data related to readings at said sensing units and operation of the frame/door heater.

26. (New) The system of claim 25 further comprising means for wirelessly accessing stored data at said data storing means.

27. (New) The system of claim 21 wherein said means for wirelessly accessing data is configured for remotely updating control parameters at said control means utilized for monitoring case frame temperature, ambient

air temperature and relative humidity to anticipate formation of condensation at the display case and activating and deactivating the frame/door heater.

REMARKS

Claims 1 through 13 and 21 through 27 are now in this Application. This amendment is submitted in view of the Examiner's requirement to restrict claims.

Claims 14 through 20 have been canceled by this Amendment and claims 21 through 27 are new claims added by this Amendment. Claim 1 has been amended to change the "connected" to "communicating" in the forth full paragraph.

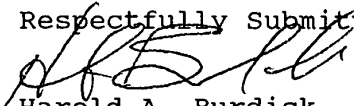
Also enclosed herewith are replacement drawing sheets for sheets 1 through 29 (all drawing sheets, formalizing numbers and lead lines). No substantive changes to the drawings have been made.

Finally, a copy of the Filing Receipt is enclosed herewith with a change (shown in red ink) requested. The name of the inventor Robert A. Majzner has been misspelled on the Receipt (a Patent Office error) and correction is requested.

The period for response has been extended (for one month, from October 8, 2006 to November 8, 2006) by Petition for Extension of the Period for Response and fee (\$60.00 for a small entity) submitted herewith.

PATENT

An early action on the merits of this application is respectfully solicited.

Respectfully Submitted,

Harold A. Burdick
Registration No. 32,725

HAB
Telephone: (303) 530-1355



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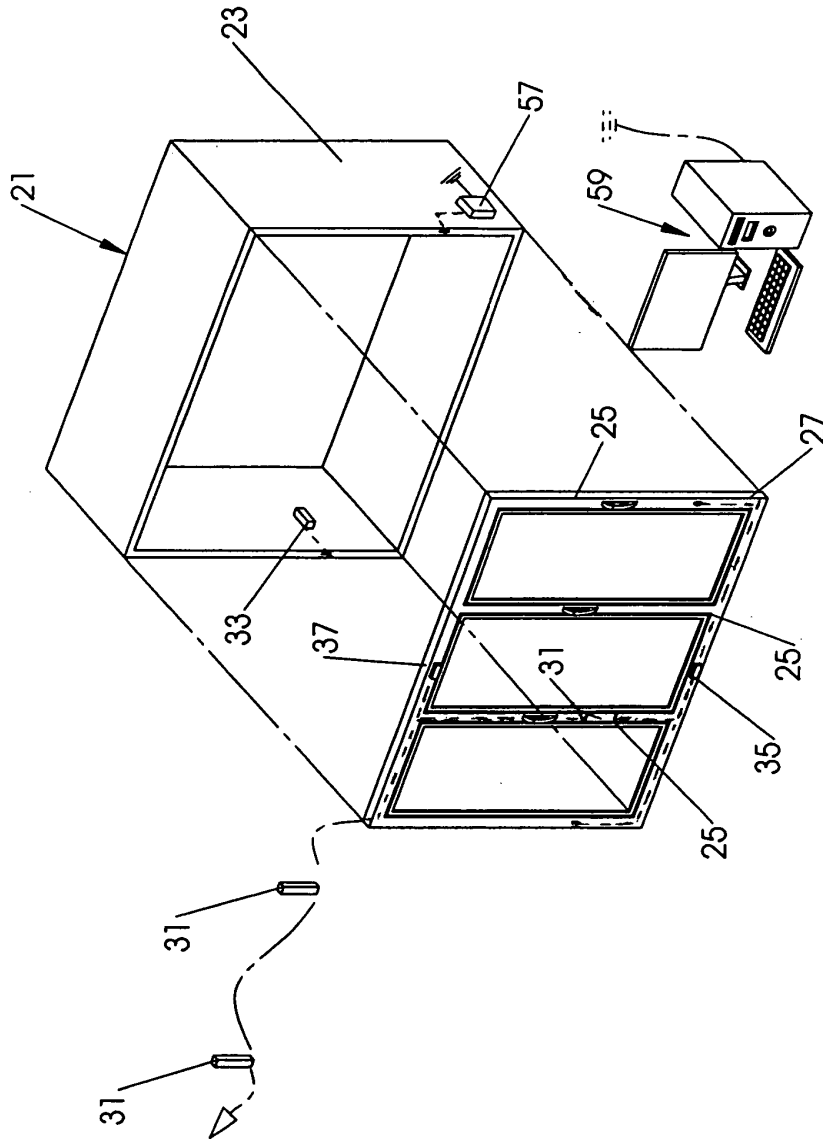


FIGURE 1

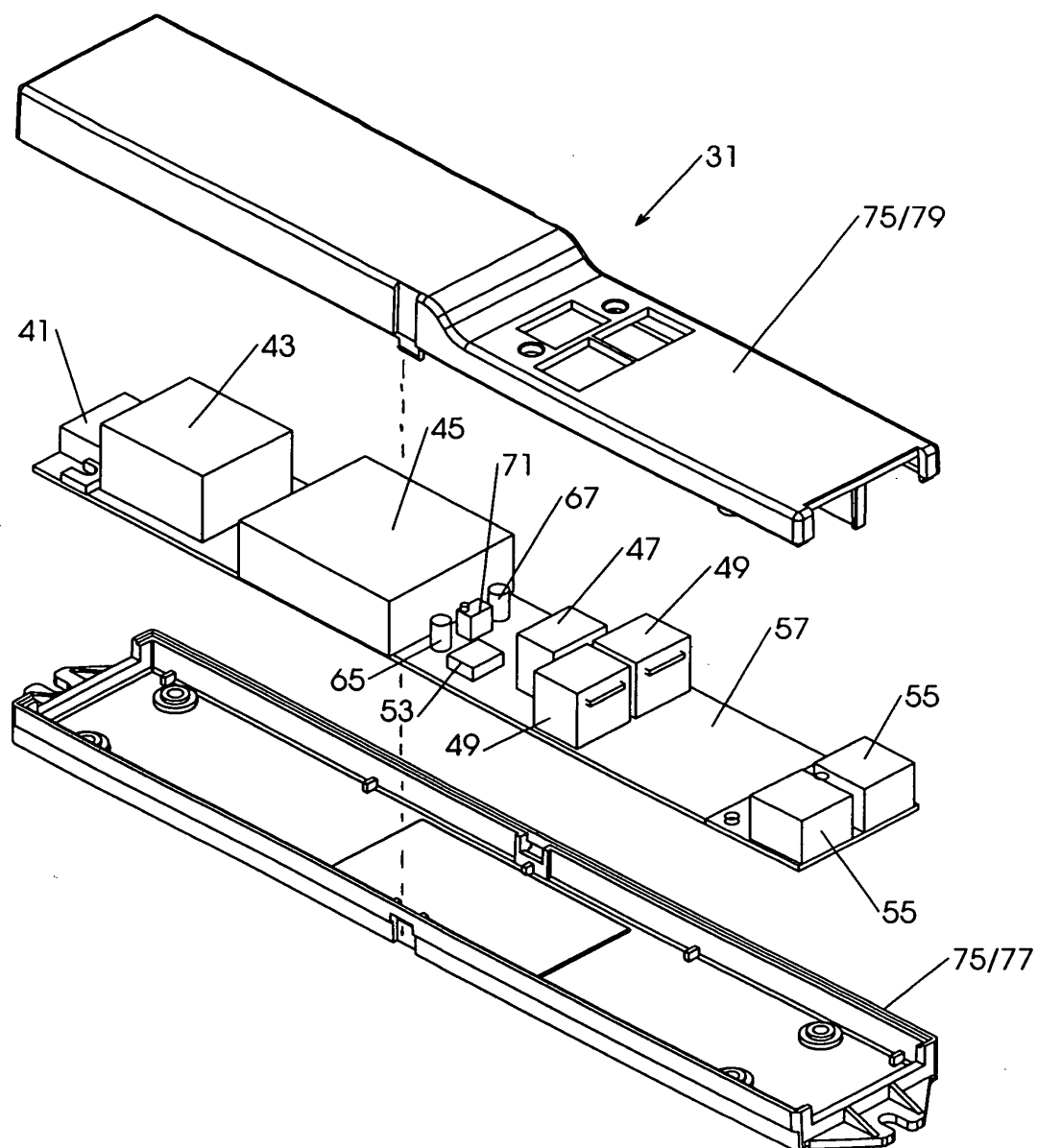
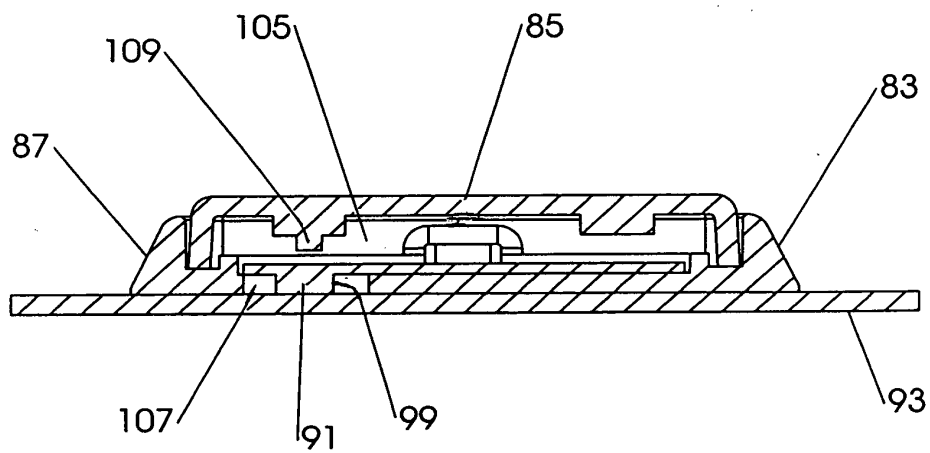
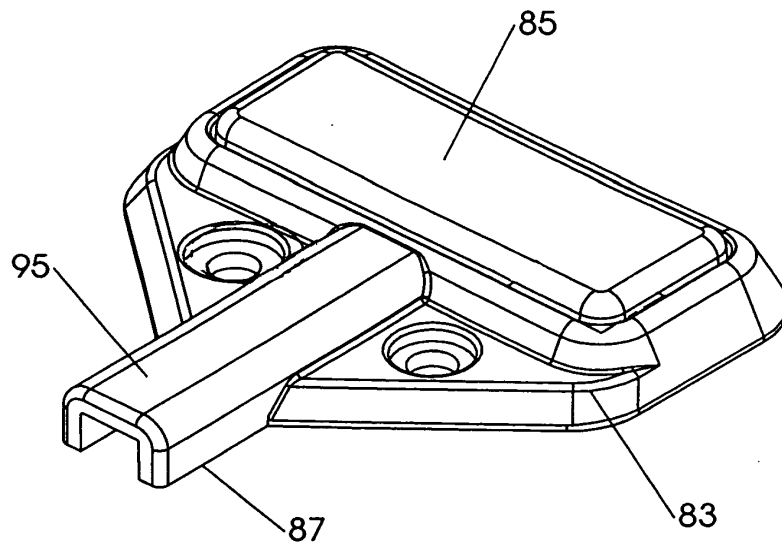


FIGURE 2

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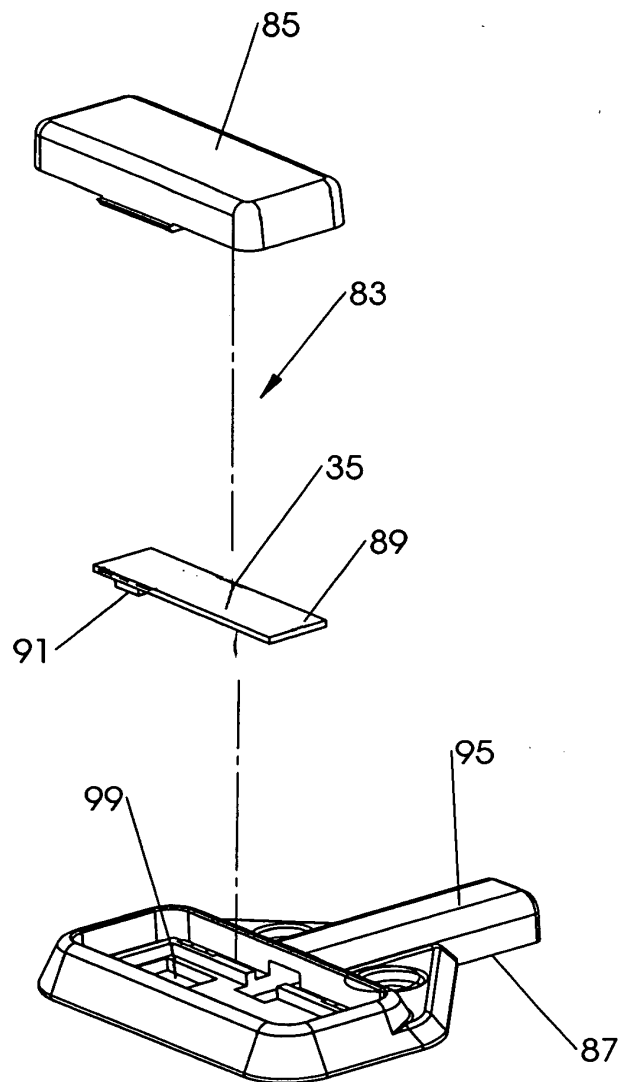


FIGURE 4

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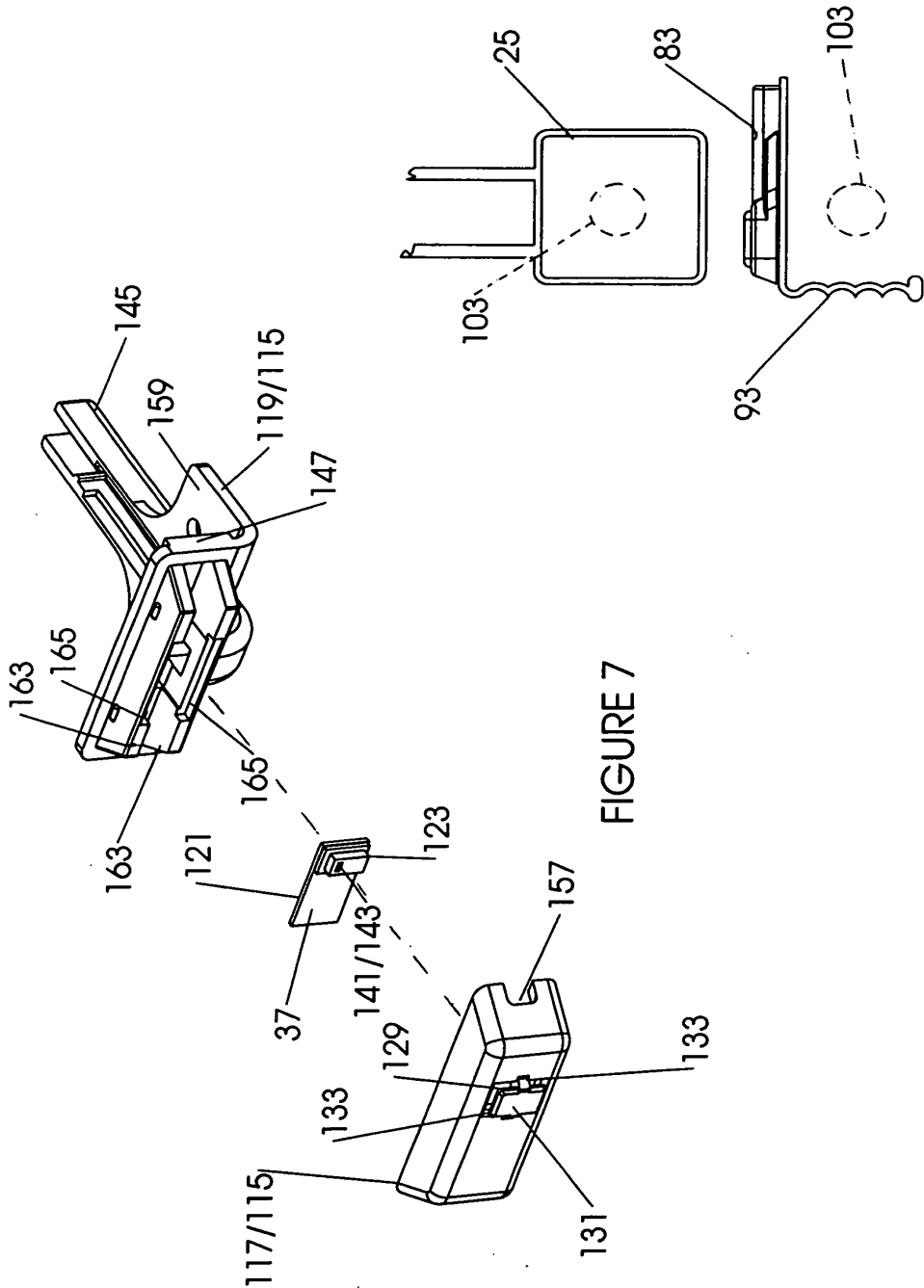


FIGURE 6

FIGURE 7

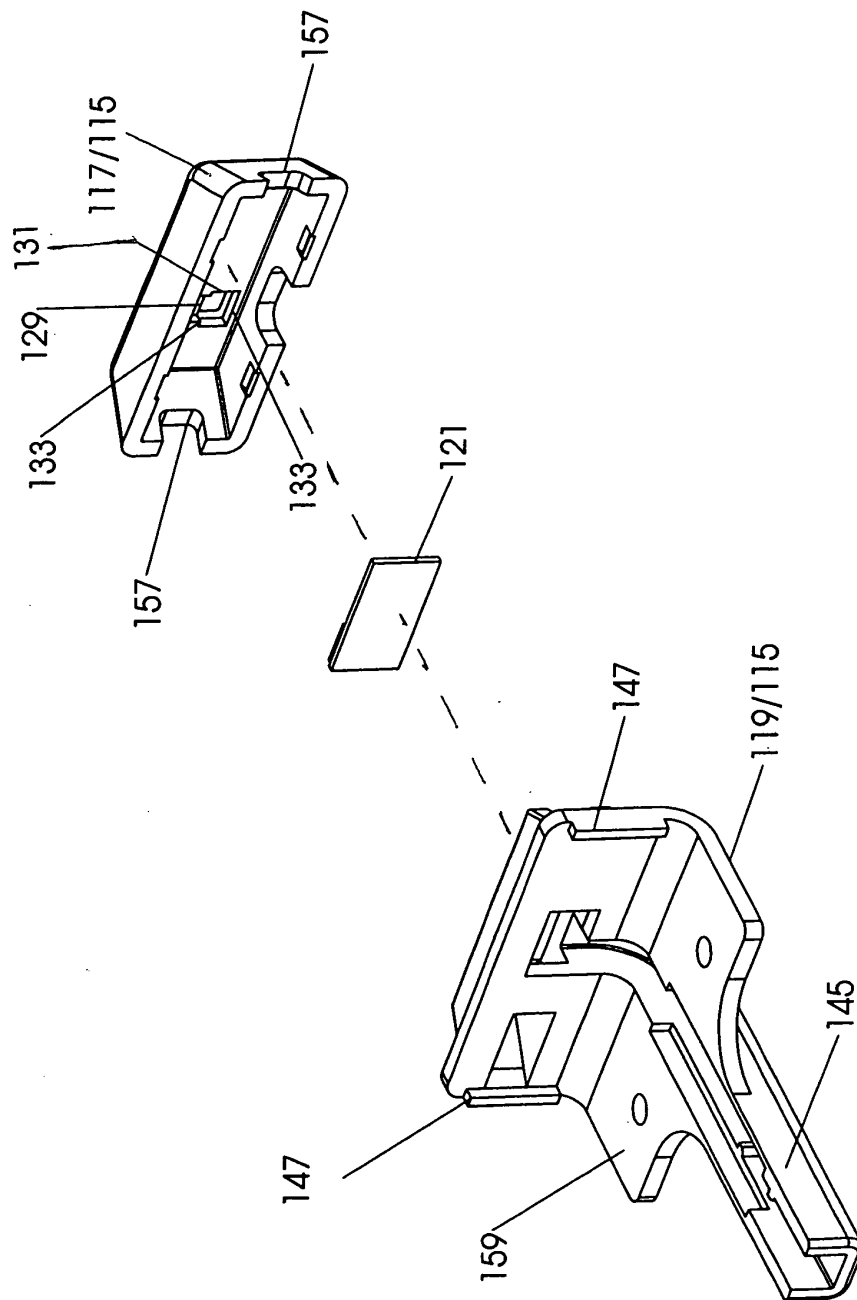


FIGURE 8

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Replacement Sheet 7

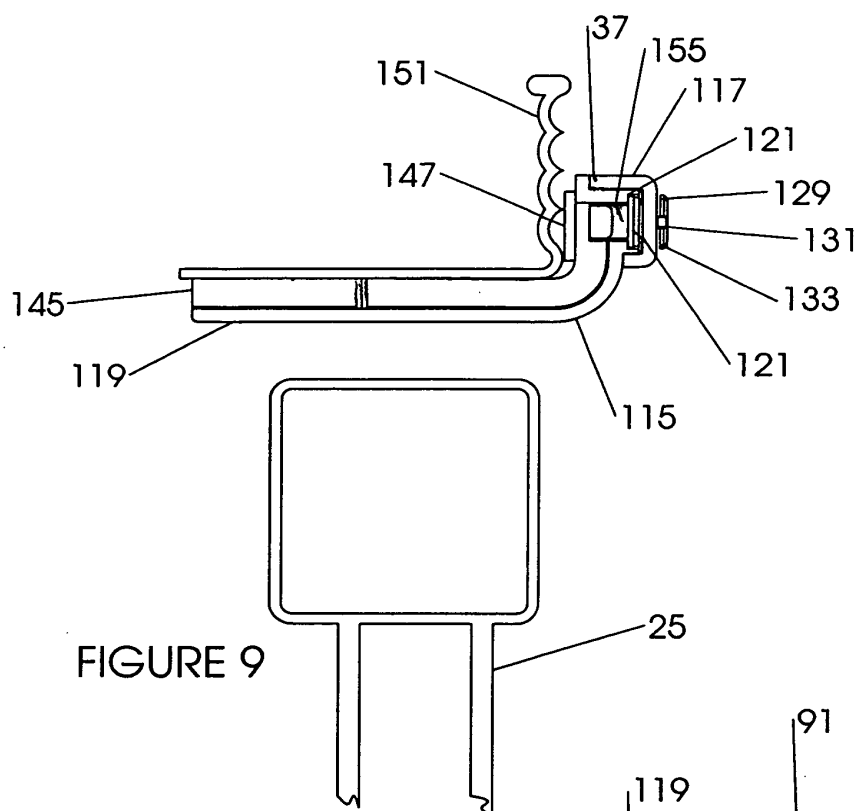


FIGURE 9

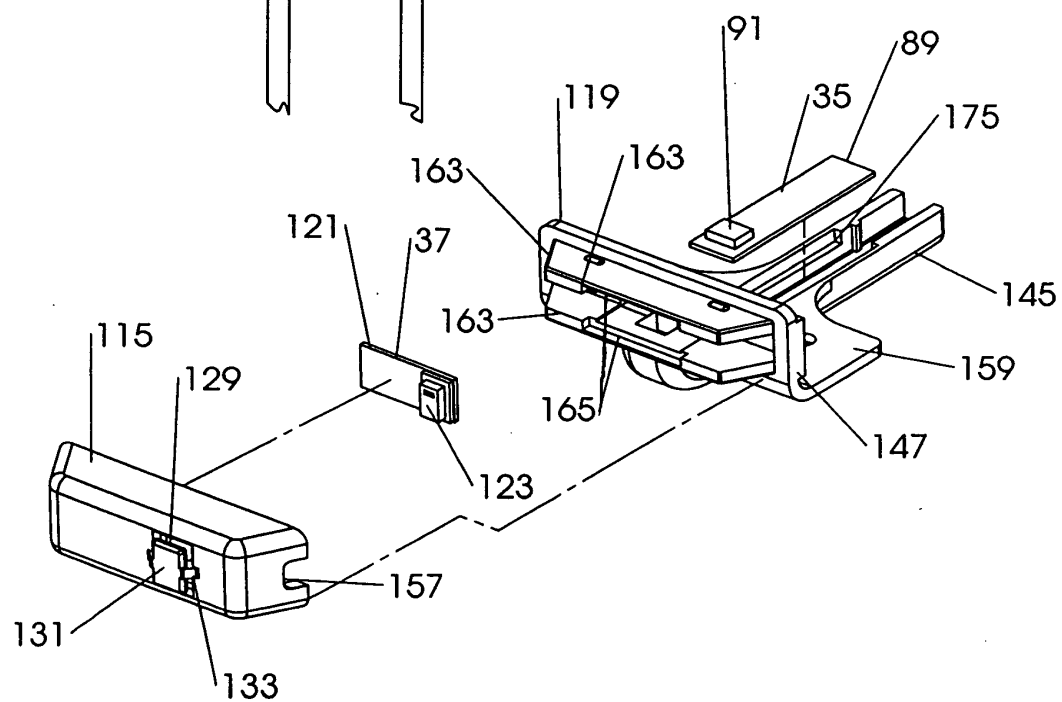
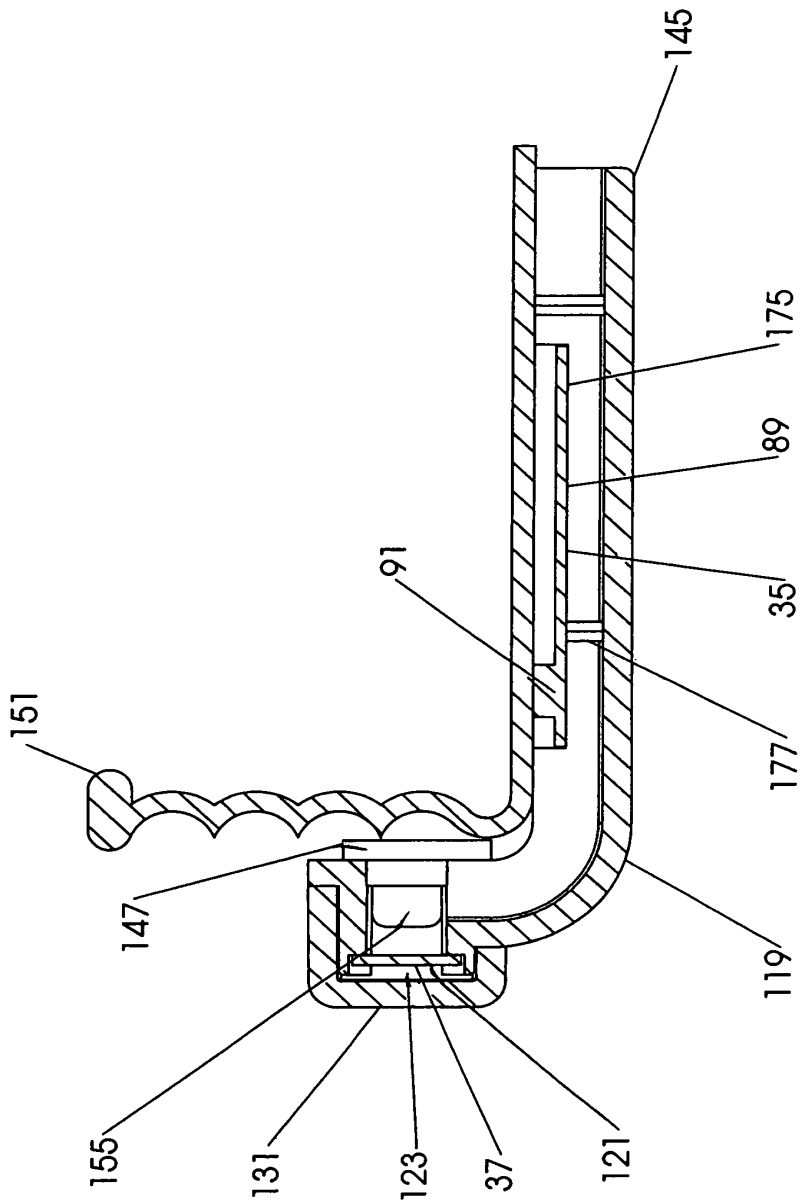


FIGURE 10
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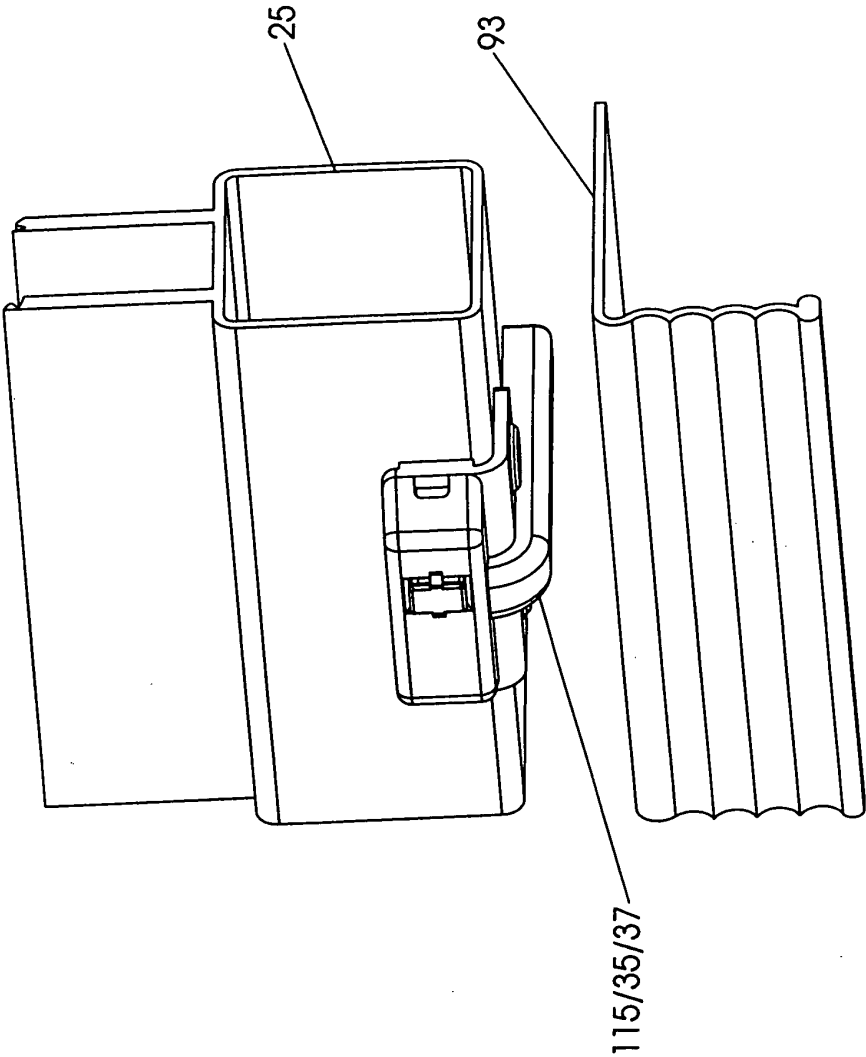


FIGURE 12

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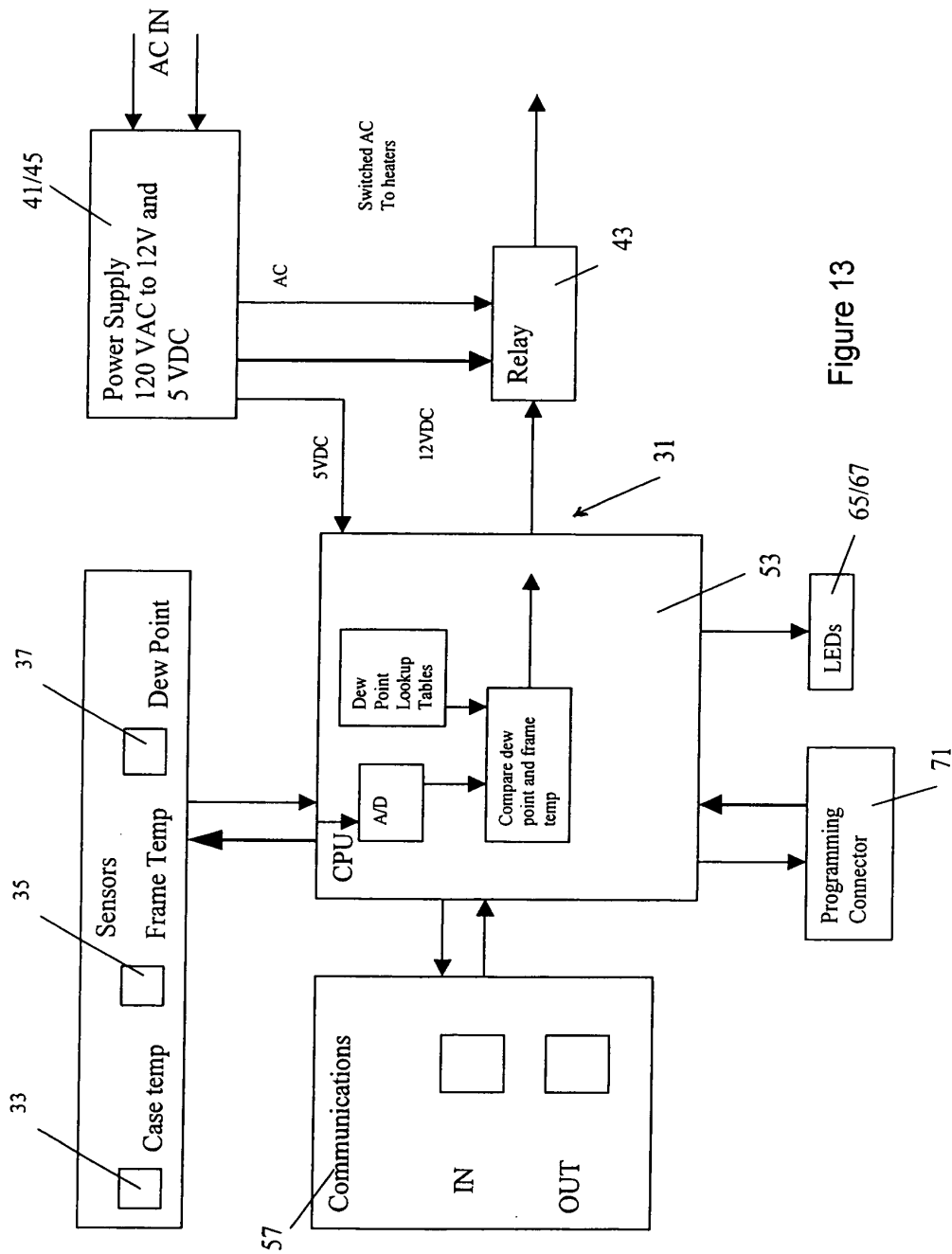


Figure 13

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Figure 14a

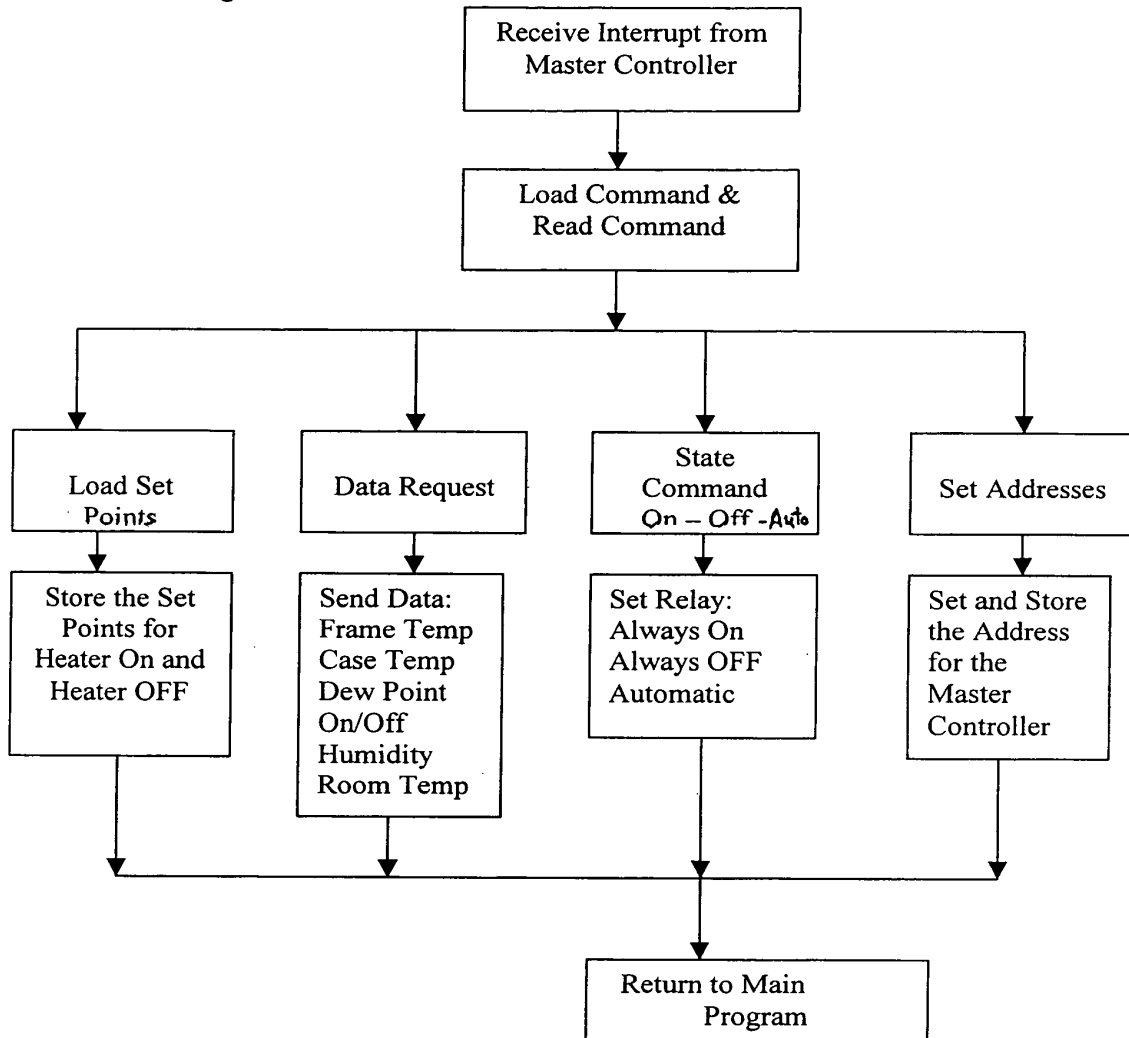
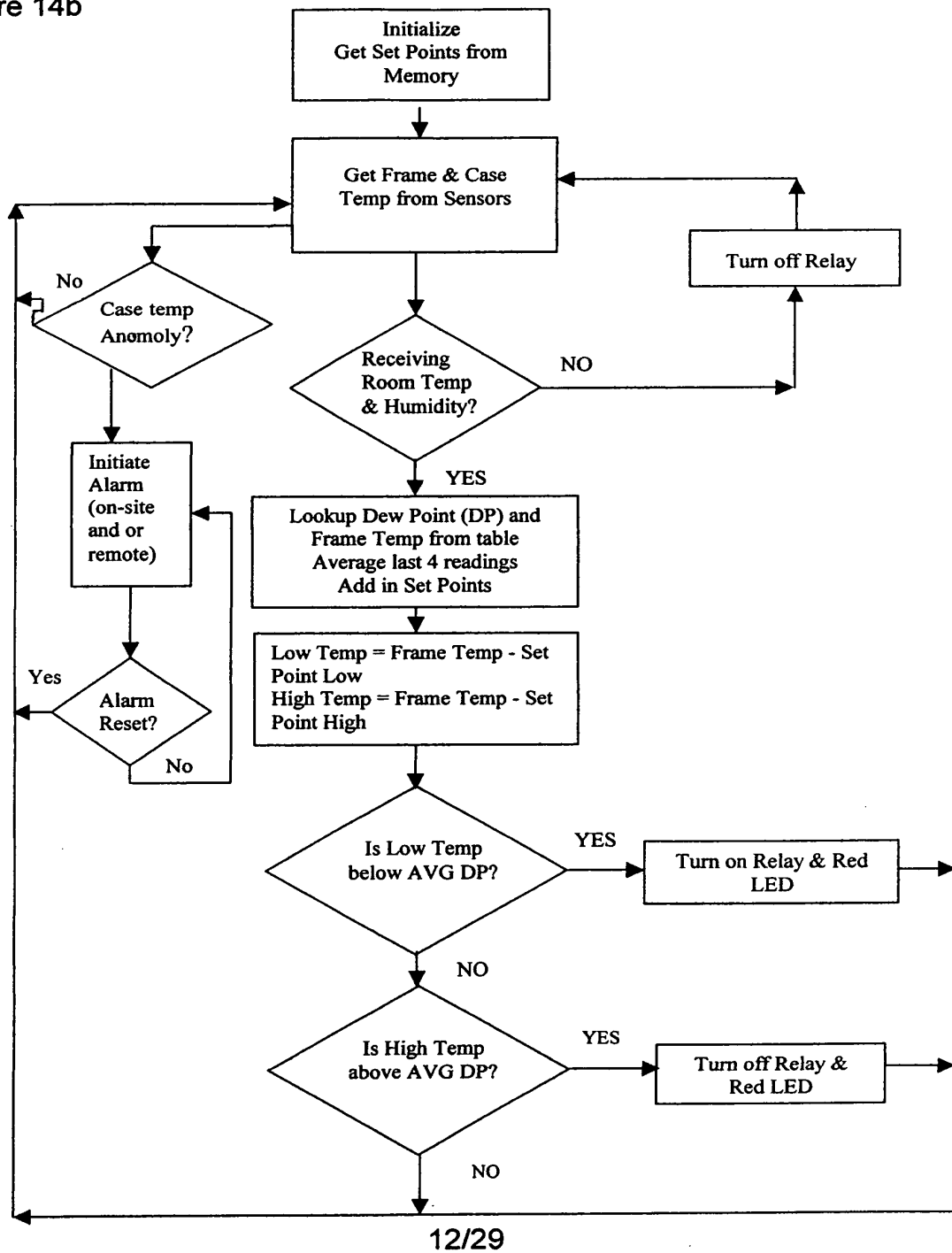


Figure 14b



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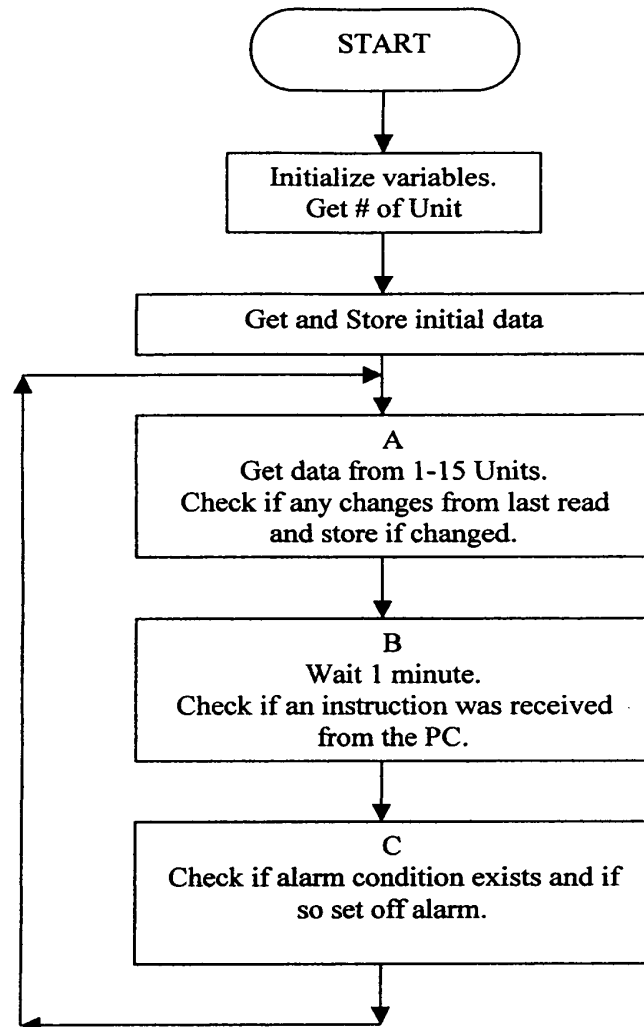


Figure 14c

Figure 14d

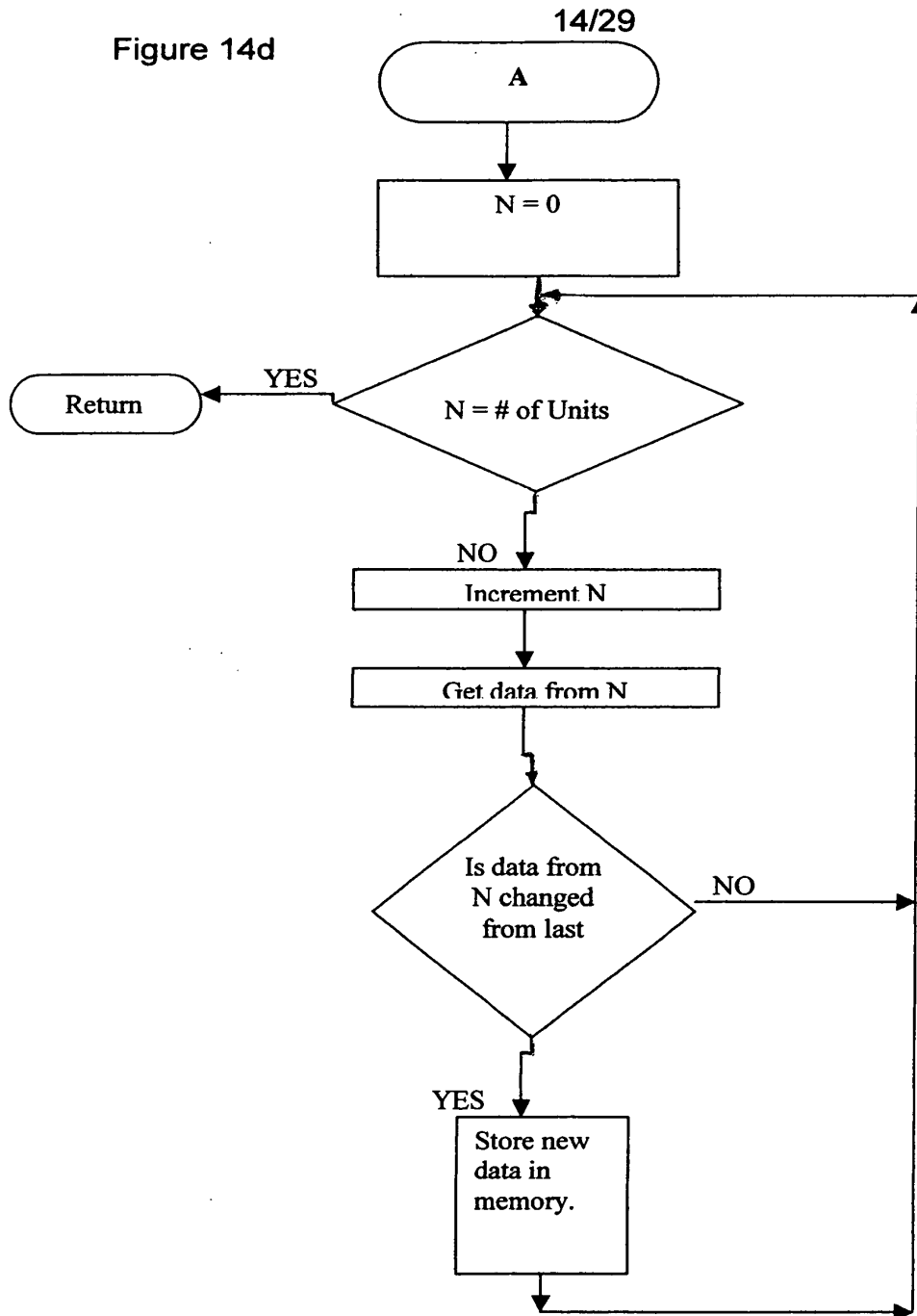
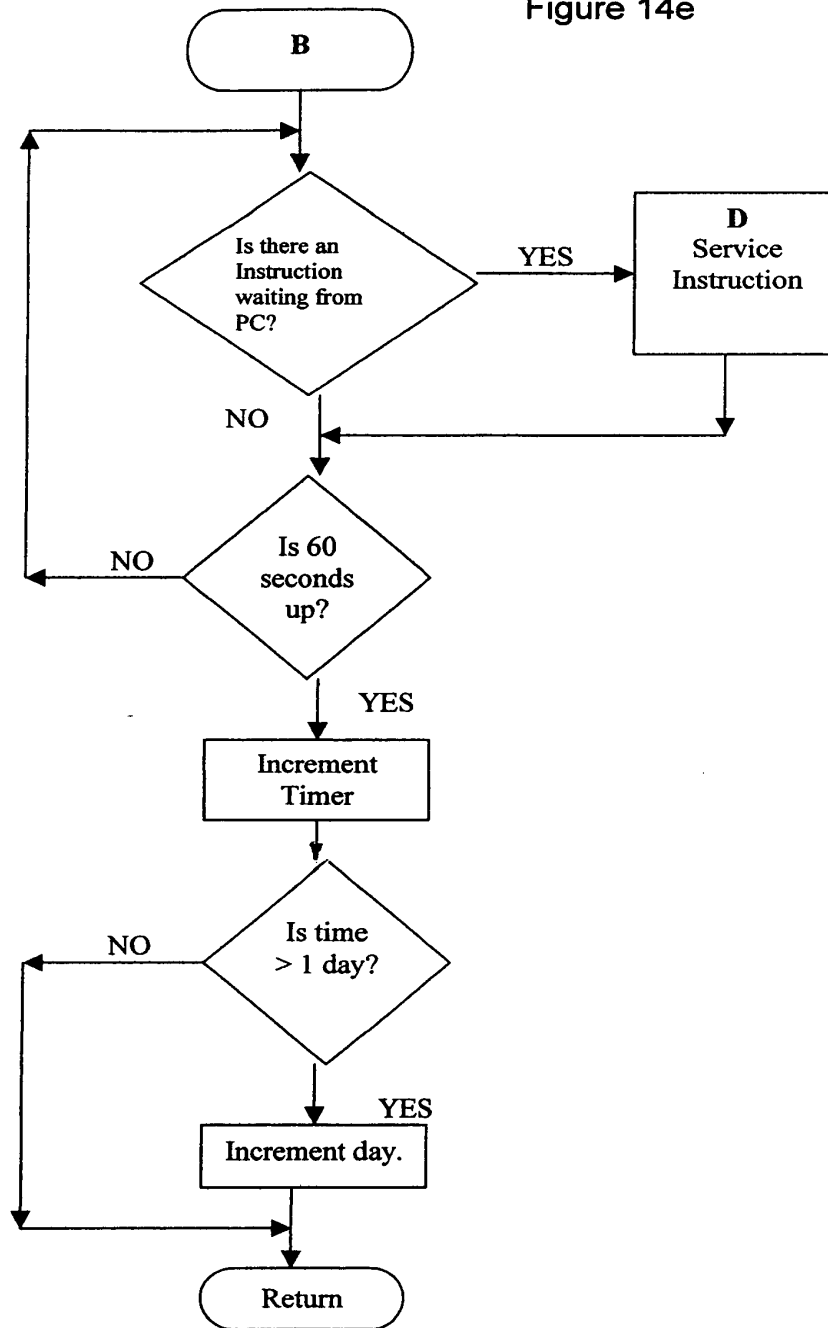


Figure 14e



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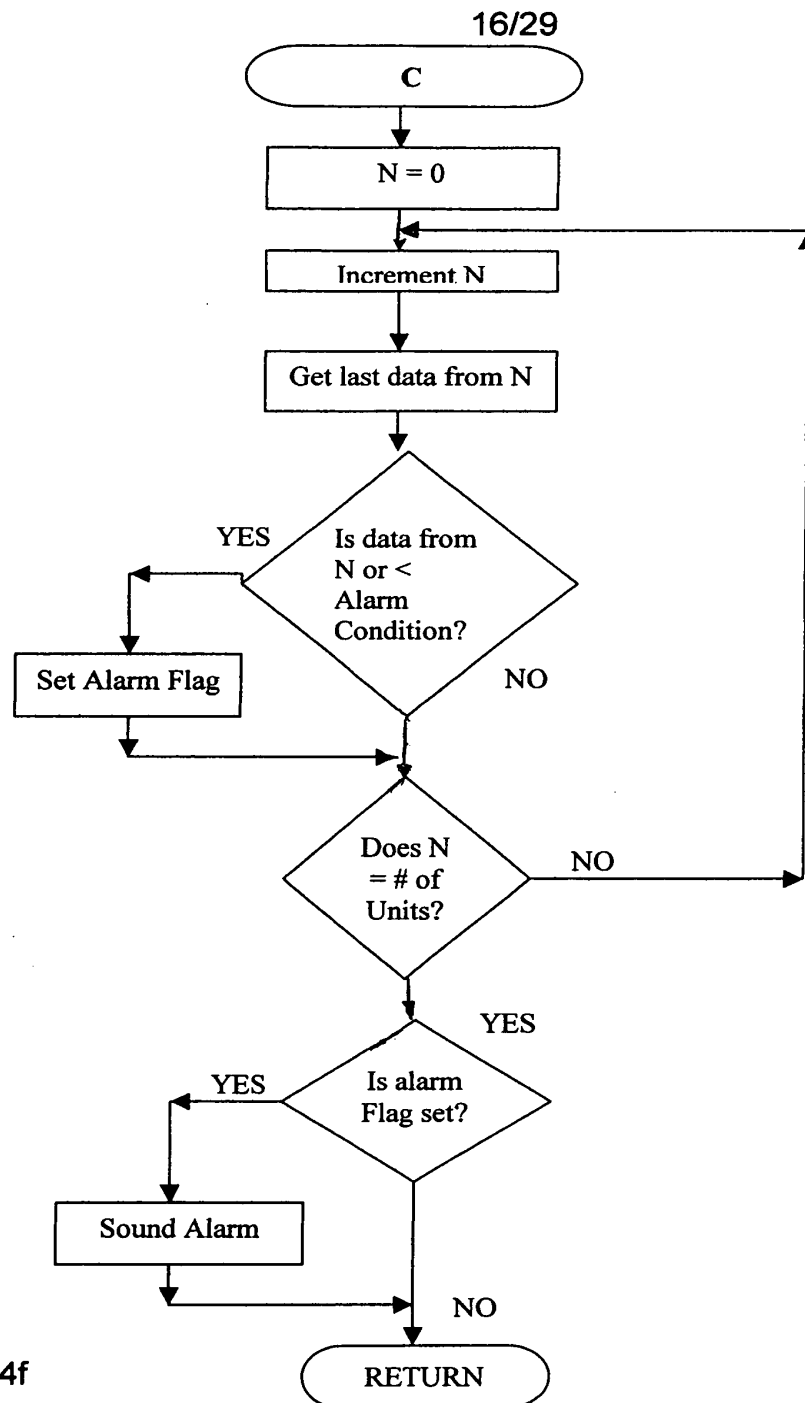
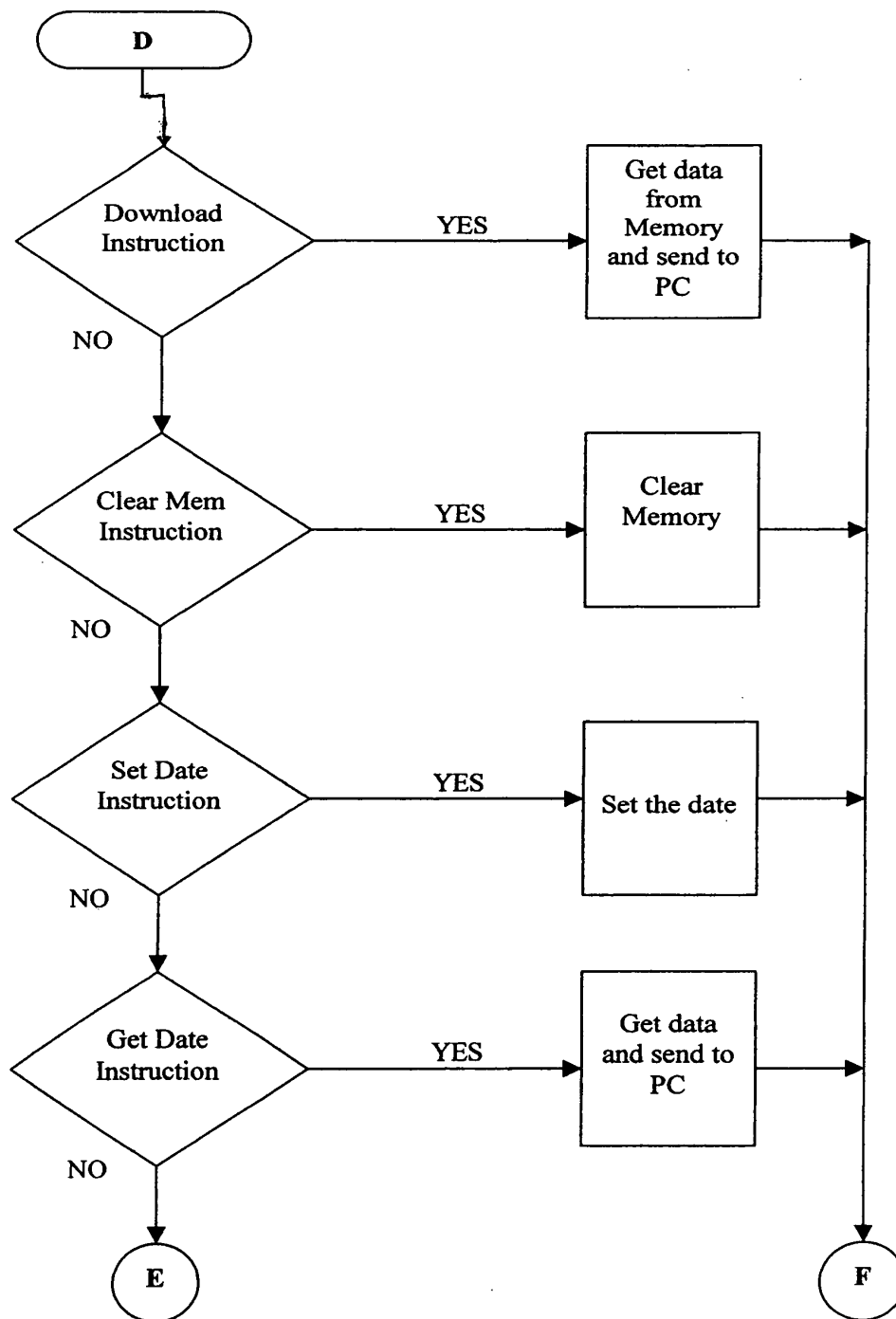


Figure 14f

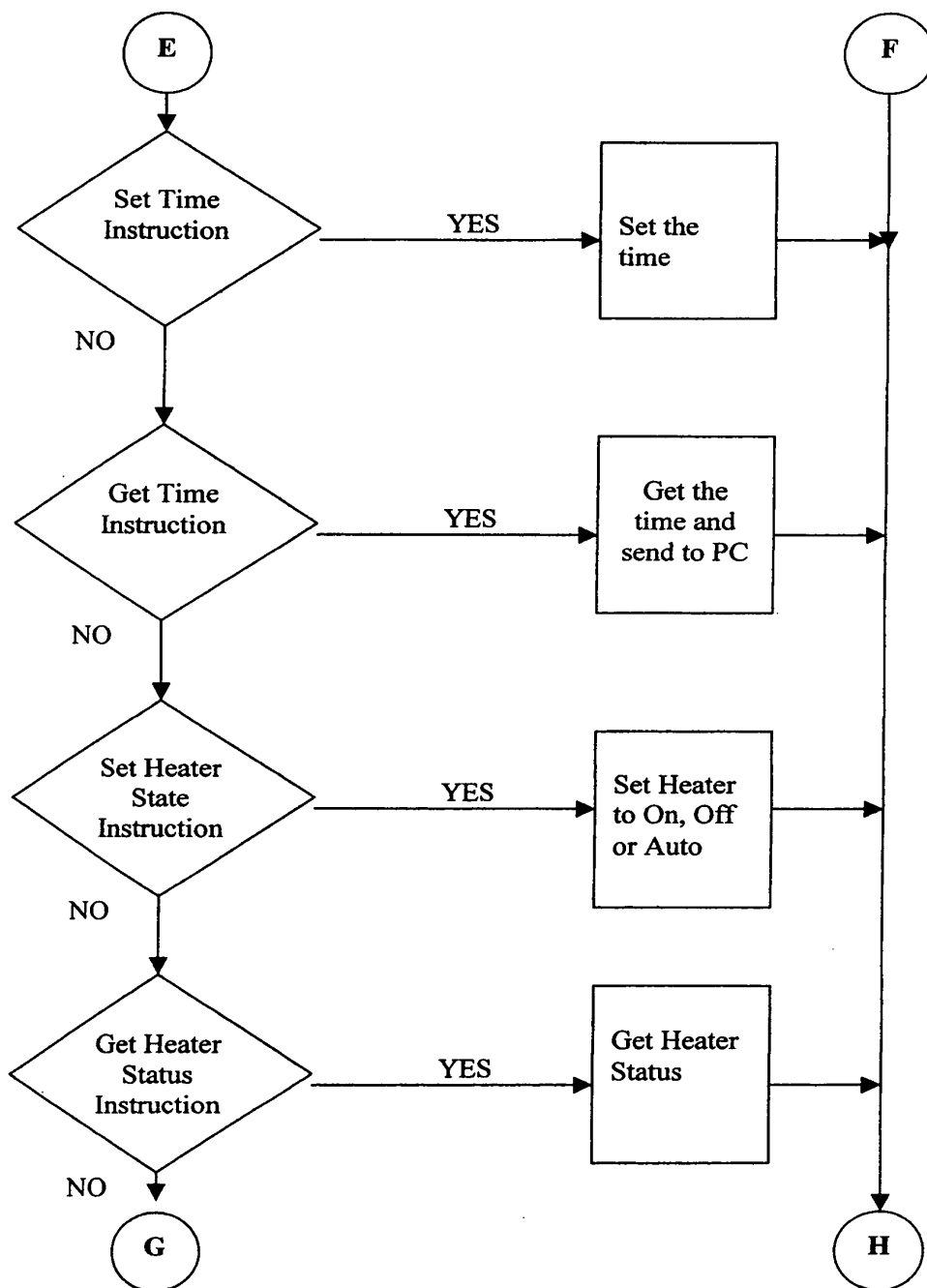
17/29

Figure 14g



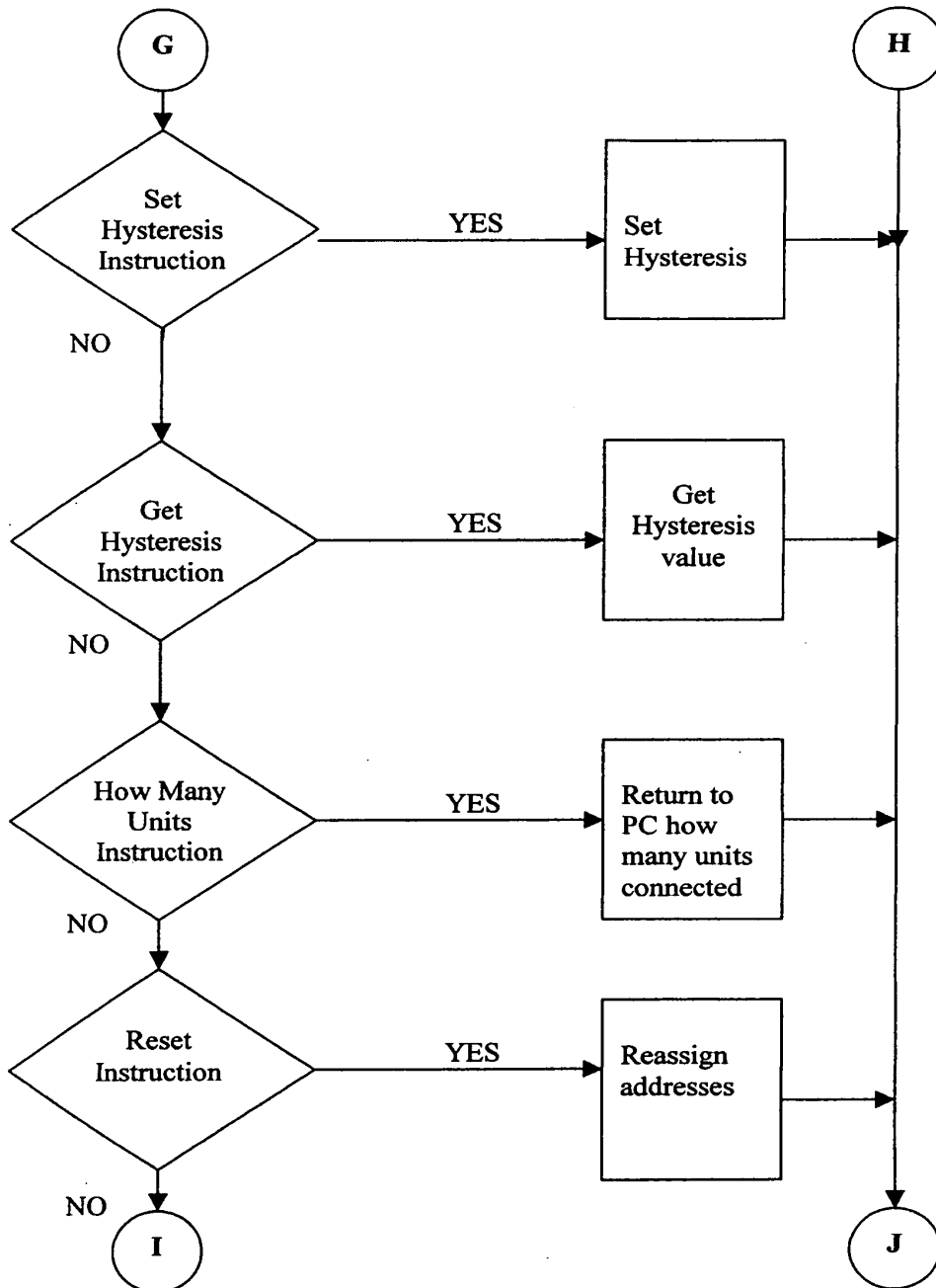
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FIGURE 14h



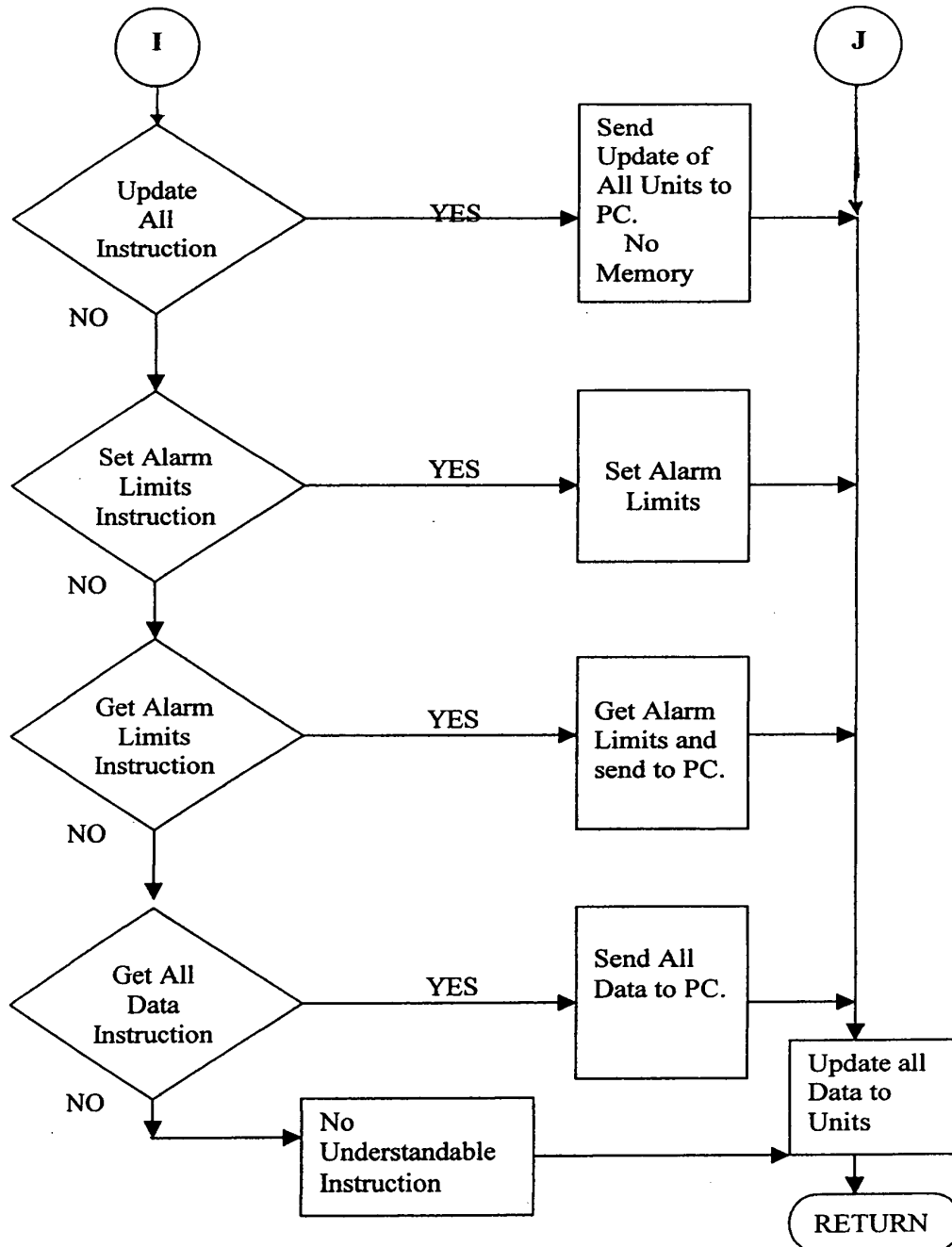
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FIGURE 14i



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FIGURE 14j



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Figure 15a

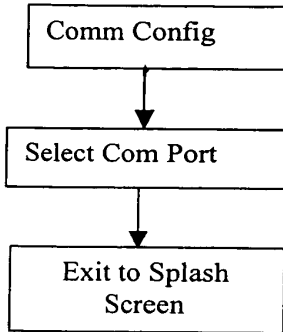


Figure 15b

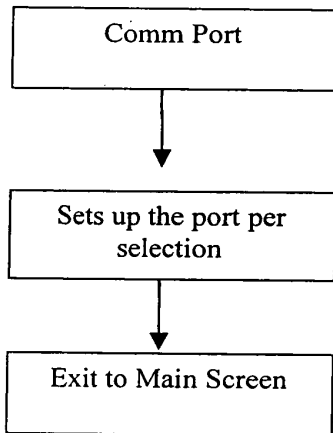


Figure 15c

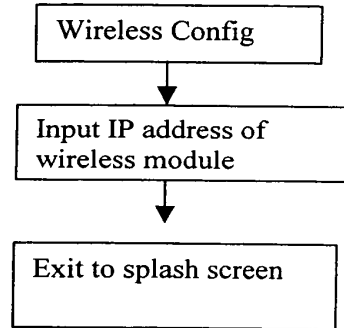
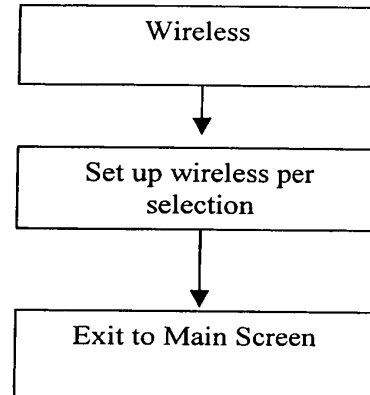


Figure 15d



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Figure 15e

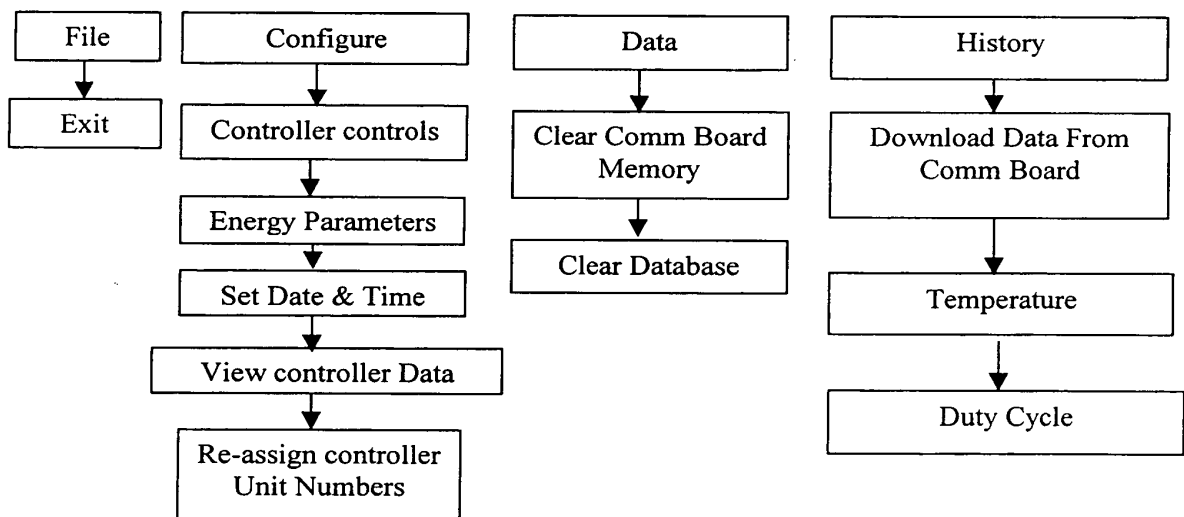
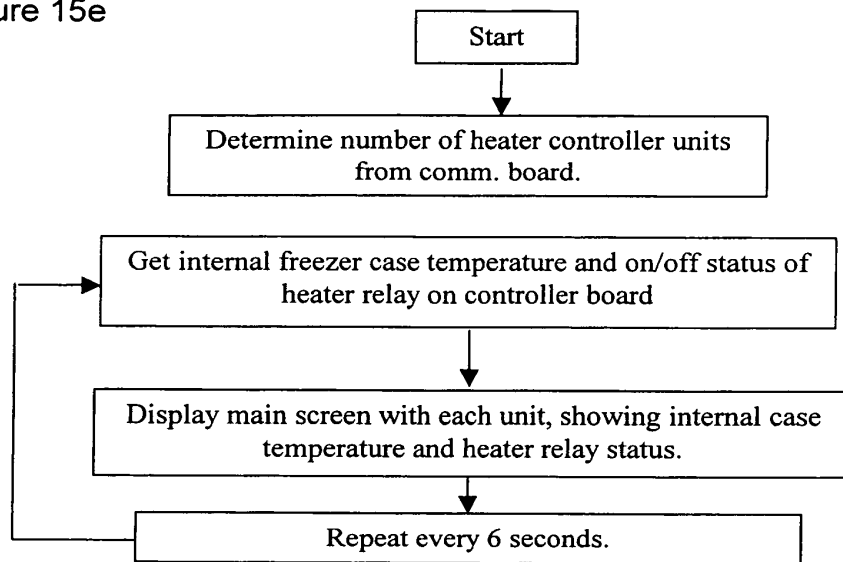


Figure 15f

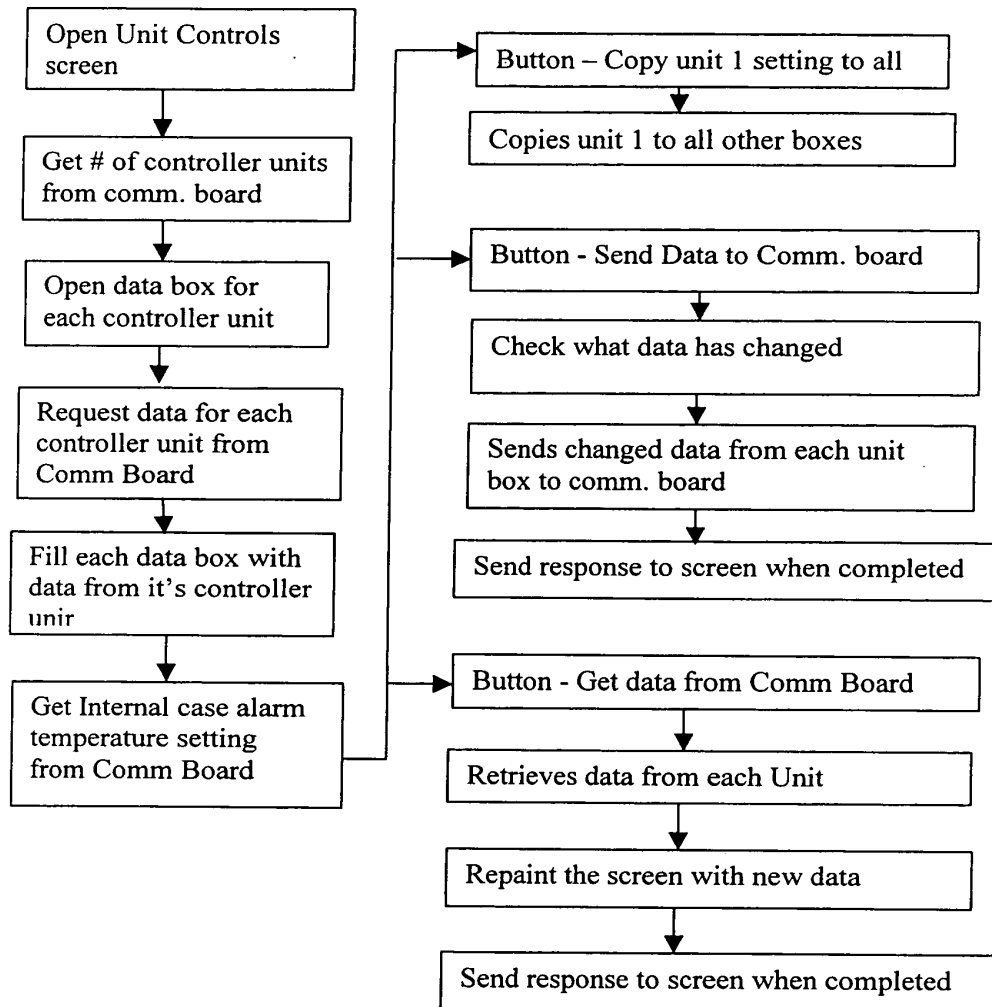


Figure 15g

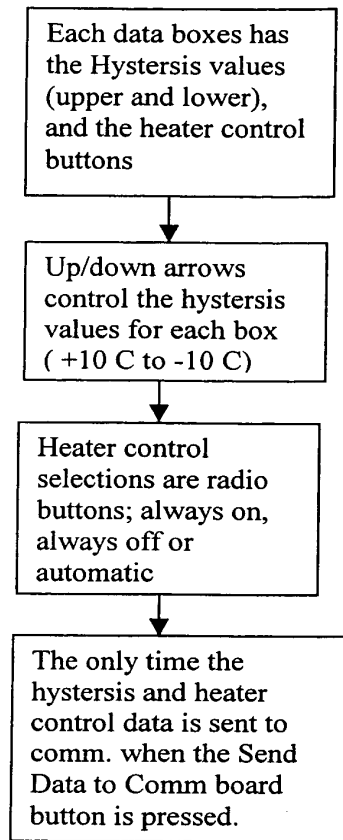


Figure 15h

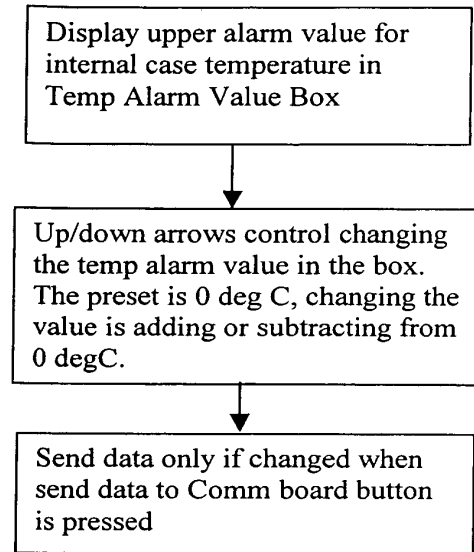
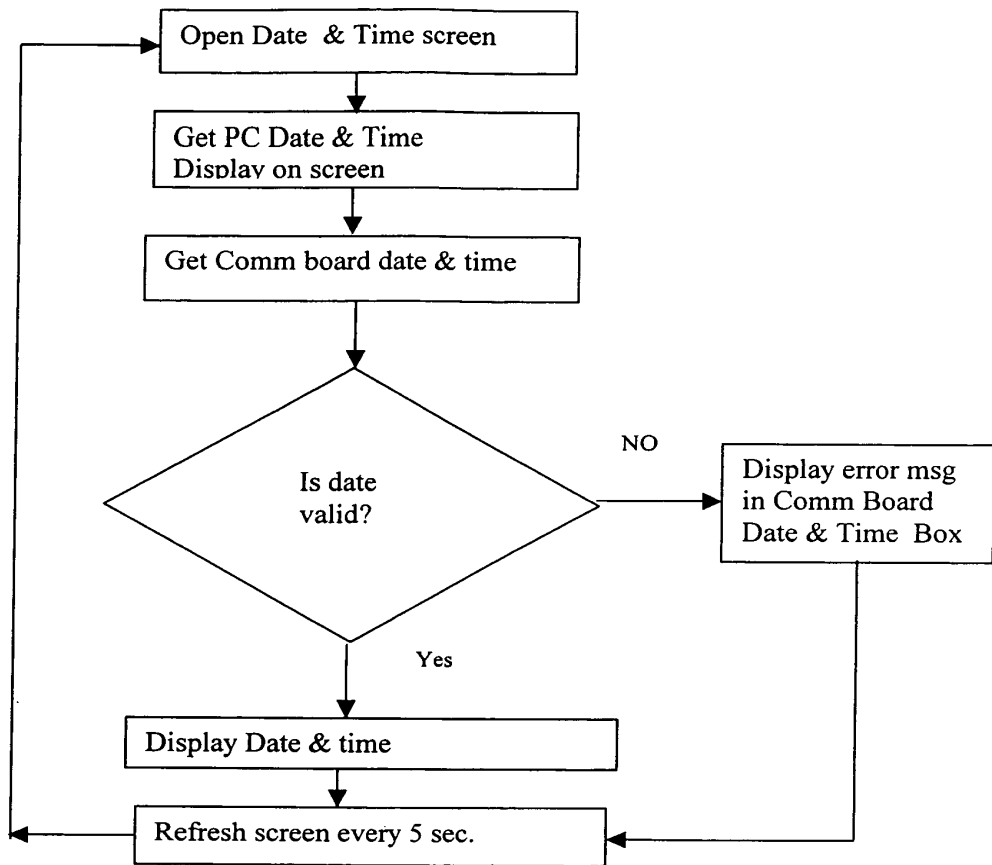


Figure 15i

Figure 15j

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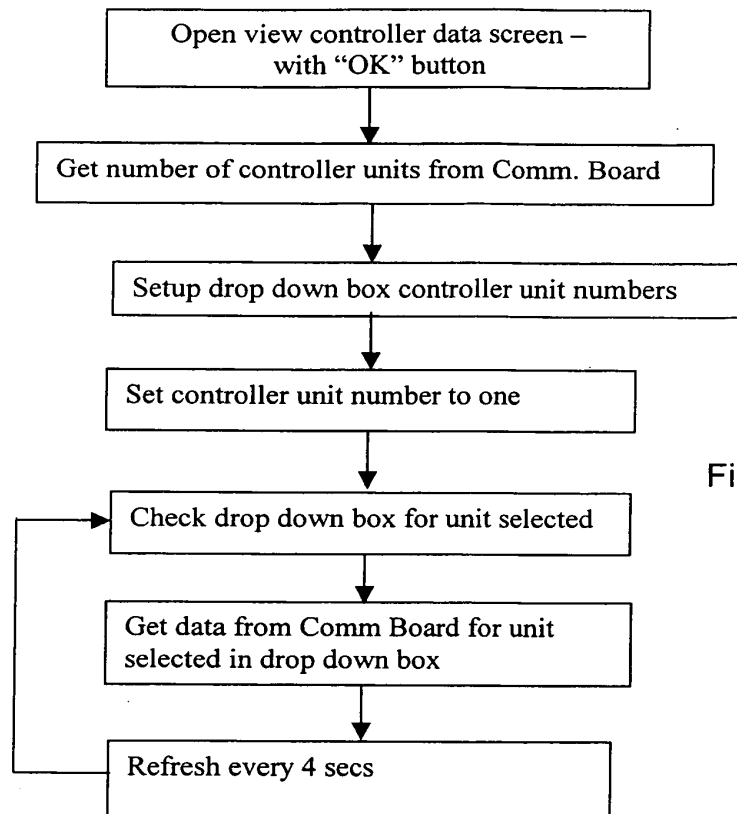


Figure 15k

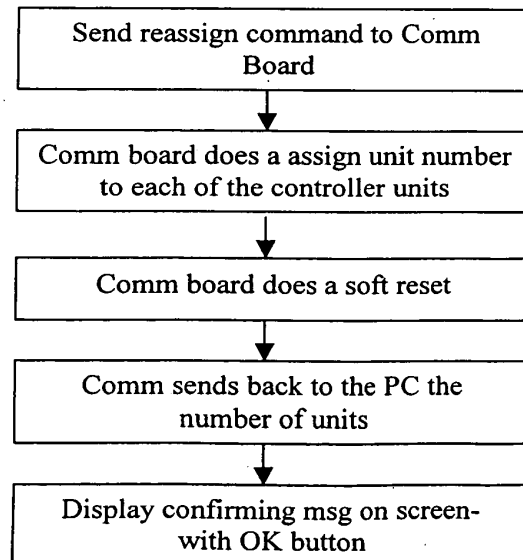


Figure 15l

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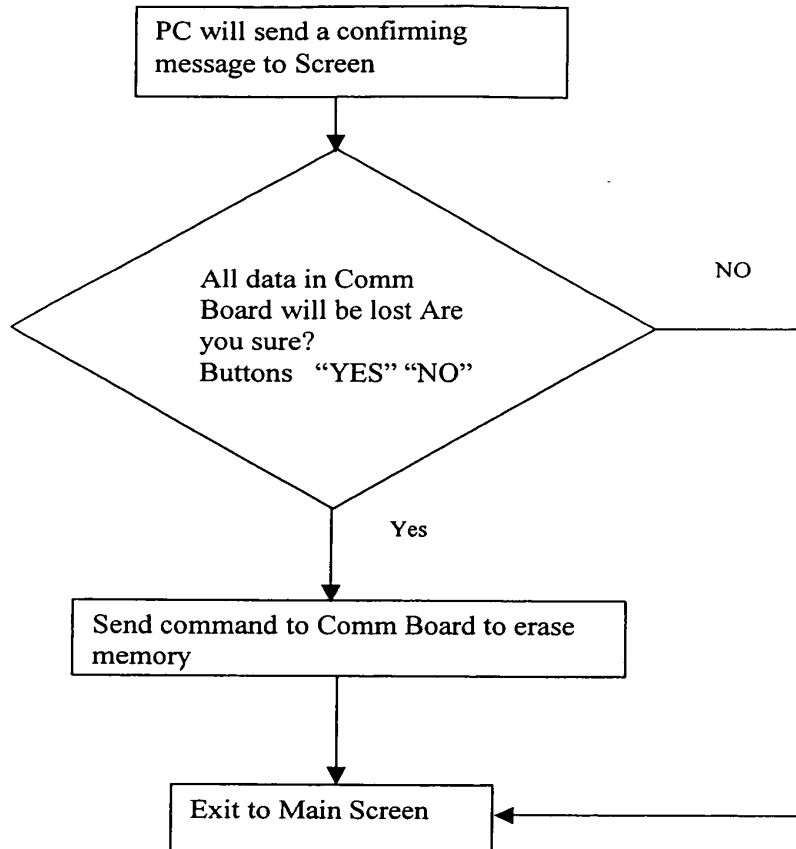


Figure 15m

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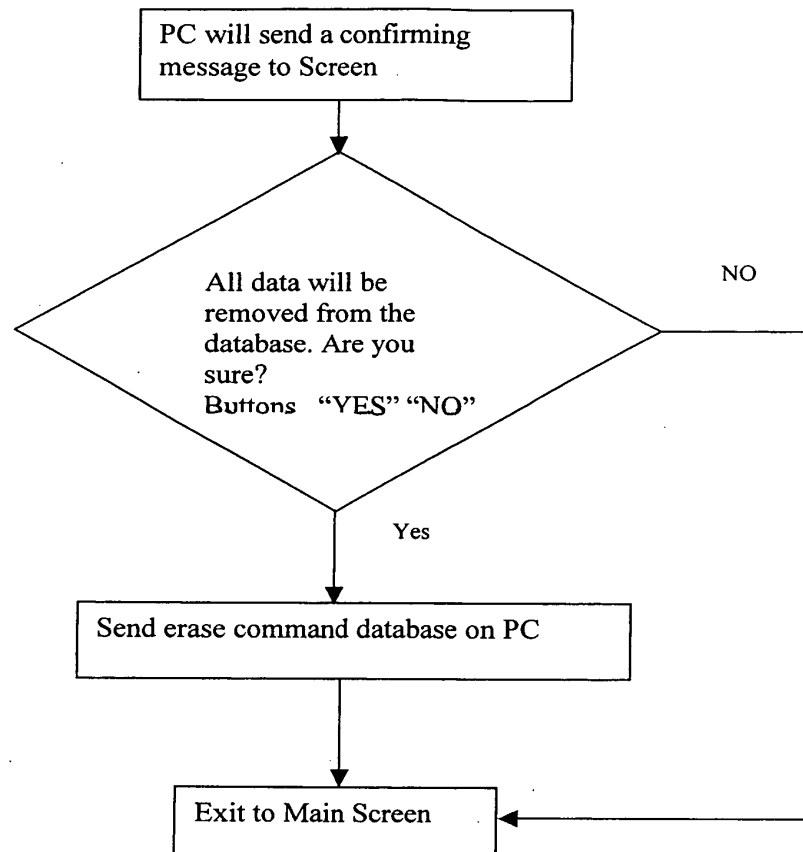


Figure 15n

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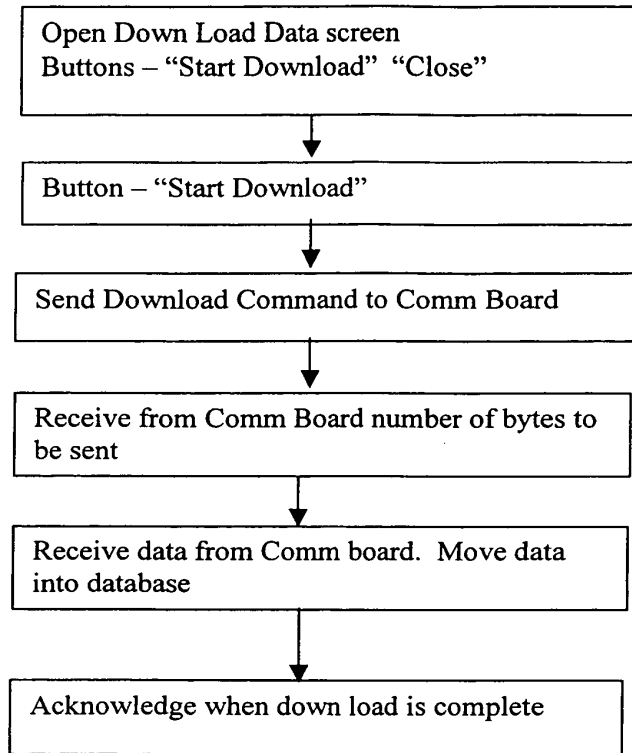


Figure 15o

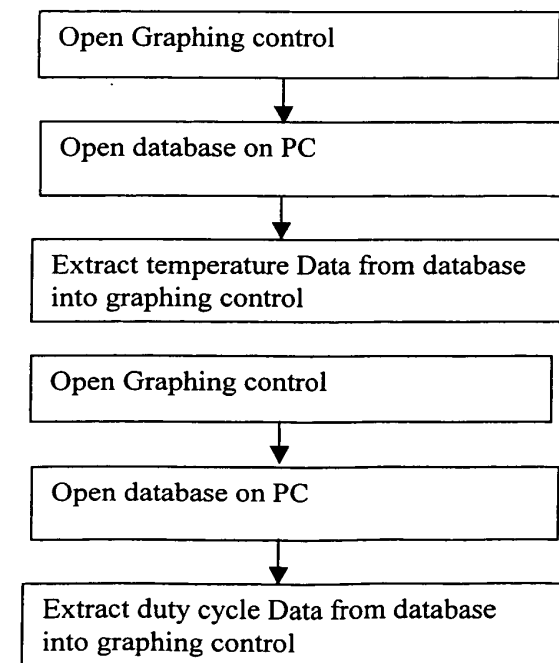


Figure 15p

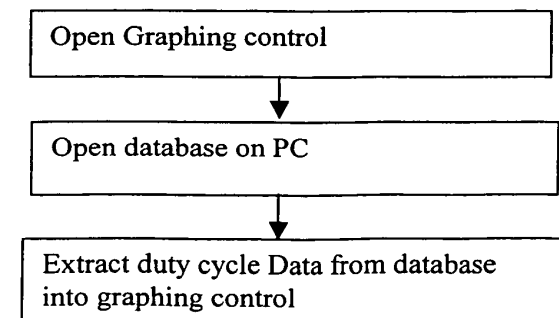


Figure 15q

IFW
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Murray et al.
Serial Number : 11/069,378
Filing Date : March 1, 2005
For : REFRIGERATION UNIT
CONDENSATION PREVENTION
Group Art Unit : 3744
Examiner : Tapolcai, William E.



PETITION FOR EXTENSION OF THE PERIOD FOR RESPONSE

ELECTION, PRELIMINARY AMENDMENT, TRANSMITTAL OF REPLACEMENT
(FORMAL) DRAWINGS, AND REQUEST FOR CORRECTION OF FILING
RECEIPT

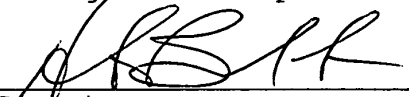
Certificate of Mailing

The Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

I hereby certify that this correspondence is being
deposited with the United States Postal Service as first class
mail in an envelope addressed to Commissioner for Patents,
Mail Stop Amendment, P.O. Box 1450, Alexandria, VA 22313-
1450, on November 3, 2006.

Harold A. Burdick
Name of Applicant, Assignee
or Registered Representative


Signature

11-3-06
Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Murray et al.
Serial Number : 11/069,378
Filing Date : March 1, 2005
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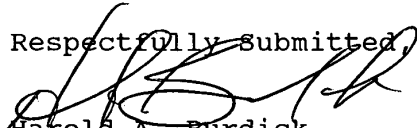


PETITION FOR EXTENSION OF THE PERIOD FOR RESPONSE

ELECTION, PRELIMINARY AMENDMENT, TRANSMITTAL OF REPLACEMENT
(FORMAL) DRAWINGS, AND REQUEST FOR CORRECTION OF FILING RECEIPT

The applicant herewith petitions the Commissioner of Patents and Trademarks to extend the time for response to the Office Action dated September 8, 2006 for one month from October 8, 2006 to November 8, 2006. Submitted herewith is our check number 1028 for \$60.00 to cover the cost of the extension.

Respectfully Submitted,


Harold A. Burdick
Registration No. 32,725

HAB
Telephone: (303) 530-1355

11/07/2006 CNGUYEN 00000025 11069378

01 FC:2251

60.00 OP

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD					Application or Docket Number 11069378	
Substitute for Form PTO-875						
APPLICATION AS FILED – PART I						
(Column 1)		(Column 2)		SMALL ENTITY		OR
OTHER THAN SMALL ENTITY						
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	RATE (\$)	FEE (\$)
BASIC FEE						
SEARCH FEE (37 CFR 1.16(k), (l), or (m))						
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))						
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 =	*	X	=	X
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =	*	X	=	X
APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))						
				TOTAL	TOTAL	
* If the difference in column 1 is less than zero, enter "0" in column 2.						
APPLICATION AS AMENDED – PART II						
(Column 1)		(Column 2)		SMALL ENTITY		OR
OTHER THAN SMALL ENTITY						
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)
Total (37 CFR 1.16(i))	20	Minus	20	=	X 25.00	=
Independent (37 CFR 1.16(h))	3	Minus	3	=	X 100.00	=
Application Size Fee (37 CFR 1.16(s))						
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
				TOTAL ADD'L FEE	TOTAL ADD'L FEE	
(Column 1)		(Column 2)		SMALL ENTITY		OR
OTHER THAN SMALL ENTITY						
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)
Total (37 CFR 1.16(i))	*	Minus	**	=	X	=
Independent (37 CFR 1.16(h))	*	Minus	**	=	X	=
Application Size Fee (37 CFR 1.16(s))						
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
				TOTAL ADD'L FEE	TOTAL ADD'L FEE	
* 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.						

This collection of information is required by 37 CFR 1.16. 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 1.14. This collection is estimated to take 12 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 7.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/069,378	03/01/2005	Brent W. Murray		9778

23121 7590 09/08/2006

THE LAW FIRM OF HARRIS & BURDICK
HAROLD BURDICK AND ROBERT HARRIS
6676 GUNPARK DRIVE
SUITE E
BOULDER, CO 80301

EXAMINER

TAPOLCAI, WILLIAM E

ART UNIT

PAPER NUMBER

3744

DATE MAILED: 09/08/2006

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

Office Action Summary	Application No. 11/069,378	Applicant(s) MURRAY ET AL.	
	Examiner William E. Tapolcai	Art Unit 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 1 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 ____.
- 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) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☐ Claim(s) ____ is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☒ Claim(s) 1-20 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 ____ 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) | 4) ☐ Interview Summary (PTO-413) |
| 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____ |
| 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) ☐ Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date ____ | 6) ☐ Other: ____ |

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-13, drawn to a condensation control apparatus for a refrigerated case, classified in class 62, subclass 248.
 - II. Claims 14-20, drawn to a method of controlling condensation on a refrigerated display case, classified in class 62, subclass 92.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions II and I are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process as claimed can be practiced by another and materially different apparatus such as one that does not require housing means for establishing thermal isolation of the sensing units.
3. Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.
4. A telephone call was made to Harold Burdick on August 31, 2006 to request an oral election to the above restriction requirement, but did not result in an election being made.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species or invention to be examined even though the

requirement be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

The election of an invention or species may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse.

Should applicant traverse on the ground that the inventions or species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions or species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C.103(a) of the other invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William E. Tapolcai whose telephone number is (571) 272-4814. The examiner can normally be reached on Mon. - Thurs., 6:30 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl J. 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). 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.


William E. Tapolcai
Primary Examiner
Art Unit 3744

wet
August 31, 2006

Index of Claims



Application/Control No.

11/069,378

Examiner

William E. Tapolcai

Applicant(s)/Patent under Reexamination

MURRAY ET AL.

Art Unit

3744

✓	Rejected
=	Allowed

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N	Non-Elected
I	Interference

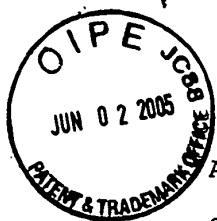
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PATENT



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Murray et al.
Serial Number : 11/069,378
Filing Date : March 1, 2005
For : REFRIGERATION UNIT
CONDENSATION PREVENTION
Group Art Unit : 3634 (Preliminary)

INFORMATION DISCLOSURE STATEMENT

Certificate of Mailing

The Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to : Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on May 30, 2005.

Harold A. Burdick

Name of Applicant, Assignee
or Registered Representative

Signature

5-30-05
Date



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Murray et al.
Serial Number : 11/069,378
Filing Date : March 1, 2005
For : REFRIGERATION UNIT
CONDENSATION PREVENTION
Group Art Unit : 3634 (Preliminary)

INFORMATION DISCLOSURE STATEMENT

Claims 1 through 20 are in this Application.

Pursuant to 37 CFR 1.56, 1.97 and 1.98, Applicant wishes to bring the U.S. Patents and publications listed on the attached Form PTO-1449 (incorporated hereinto by this reference) to the Examiner's attention, which Patents and publications are requested to be made formally of record. Copies of the publications herein referenced are enclosed herewith.

An early action on the merits of the instant application is respectfully solicited.

Respectfully submitted,

Harold A. Burdick
Registration No. 32,725

HAB
Telephone: (303) 530-1355



FORM PTO-1449 (REV. 7-20)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY. DOCKET NO.	SERIAL NO.	Sheet 1 of 1
LIST OF PRIOR ART CITED BY APPLICANT (Use several sheets if necessary)				APPLICANT MURRAY et al.	11/069,378	
				FILING DATE March 1, 2005	GROUP 3634 (Preliminary)	
U.S. PATENT DOCUMENTS						
EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA	US 5,050,721	3/18/04	Palfy et al.			
AB	6,470,696	10/02	Palfy et al.			
AC	5,778,689	7/98	Beatenbough			
AD	5,778,147	7/98	Kim			
AE	4,127,765	11/78	Heaney			
AF	6,550,261	4/03	Shima et al.			
AG	5,899,078	5/99	Nager			
AH	3,939,666	2/76	Bashark			
AI						
AJ						
AK						
FOREIGN PATENT DOCUMENTS						
	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
AL						
AM						
AN						
AO						
AP						
OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)						
AR	Door Miser Model XP; Door Miser LLP; Advertising Flyer; Publication date unknown.					
AS	Save Money by Taking Control; Door Miser LLP; WWW.DoorMiser.com; Advertising Flyer; Publication Date unknown.					
AT	New Door Miser XP; Pages 1-5 from WWW.DoorMiser.com; Publication Date Unknown.					
EXAMINER	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.						

**The Law Firm of
HARRIS & BURDICK**

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Telephone (303)530-1355

ROBERT E. HARRIS
HAROLD A. BURDICK

INTELLECTUAL PROPERTY
Patent, Trademark and
Related Matters
FAX(303)530-1357

March 1, 2005

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Patent Application Entitled: REFRIGERATION UNIT
CONDENSATION PREVENTION

By: Murray et al.

Sir:

Enclosed herewith is a patent application with informal drawings (29 sheets) for the invention described hereinabove, which application is presented for filing.

Also enclosed is an Assignment (including cover sheet) to Bradley W. Geuke and the Declaration and Power of Attorney, together with an Express Mailing Certificate and a check (number 5619) for the filing fee of \$540.00 to cover:

-Basic:	\$ 150.00
-Total number of Independent Claims (3) less 3, times \$100.00:	-0-
-Total number of Claims (20), less 20, times \$25.00:	-0-
-Search Fee:	250.00
-Examination Fee:	100.00
-Assignment recording fee:	<u>40.00</u>
TOTAL FILING FEE	\$ 540.00

The Applicant and Assignee (if any) qualify for small



entity treatment for fee purposes under U.S. law, and such status is requested.

Respectfully submitted,



Harold A. Burdick
Registration No. 32,725

HAB
Telephone: (303) 530-1355

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor : Murray et al.
Title : REFRIGERATION UNIT
CONDENSATION PREVENTION

PATENT APPLICATION TRANSMITTAL (SPECIFICATION,
CLAIMS AND DRAWINGS) BY EXPRESS MAIL
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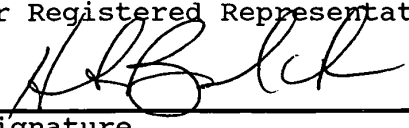
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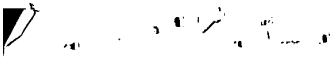
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Date of Deposit March 1, 2005

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Harold A. Burdick
Name of Applicant, Assignee
or Registered Representative


Signature



PATENT

REFRIGERATION UNIT CONDENSATION PREVENTION

By: Brent W. Murray
Patrick M. Bertsch
Robert A. Majzner

REFRIGERATION UNIT CONDENSATION PREVENTION

Field of the Invention

This invention relates to frame and/or door heating to remediate condensation build-up in refrigerated display cases, and, more particularly, relates to sensing and operating devices and methods for activation and deactivation of such heating.

Background of the Invention

Condensation build up on commercial refrigeration display case doors can cause door damage and presents a safety hazard if runoff from the door(s) and/or case frames accumulates on adjacent floors. Currently, in most commercial installations, in order to prevent excessive condensation build-up at display case doors and frames, the doors and frames are heated utilizing internal frame heaters operating at 100% duty cycle time (and incurring correspondingly high energy costs).

Devices have been heretofore suggested and/or utilized to control condensation without running heaters at 100% duty cycle times. One approach has utilized a detector to directly sense the presence of condensation on the freezer door or frame and, responsive thereto, activate the internal frame/door heaters when condensation is sensed. The heaters then are run for a fixed duration or until moisture has evaporated. These devices have, however, not always proven successful. For example, detector failure due to

environmental contamination or poor manufacturing tolerances of moisture sensors in general is common. Such detector failure can result in either frame/door heaters remaining off (thus failing to inhibit dangerous condensation build-up and runoff) or the heaters remaining on (thereby achieving no energy savings). Moreover, such devices are merely reactive, activating heaters only after potentially damaging and dangerous condensation has formed. (see the DOOR MISER XP by Door Miser, LLC and U.S. Patent No. 5,899,078, for examples).

Other devices have suggested condensation control utilizing dew point calculation. Monitoring air temperature, relative humidity and surface temperatures to initiate condensation control events has been utilized in a variety of applications including refrigeration (see, for example, U.S. Patent Publication No. US 2004/0050072 A1 and U.S. Patent Numbers 6,470,696, 5,778,689, 5,778,147, and 4,127,765). Some such devices or systems have utilized temperature sensing of both cold surfaces and the surrounding ambient air in condensation control response calculations. As is known, when a cold surface temperature is equal to or lower than the dew point of the ambient air, condensation forms on the cold surface.

Such devices and systems have not proven altogether successful, however, due to inaccuracy of temperature readings, particularly where both cold and warm environments are adjacent one another such as is found at commercial

freezer/refrigeration display cases. Failure to configure such systems to enhance accuracy of readings has resulted in erratic condensation control, on some occasions wasting energy unduly heating frames/doors, on other occasions responding late or otherwise inadequately to condensation formation, and/or on still other occasions failing to control appropriate heater cycling (i.e., shut-off) with consequent loss of efficiencies. Some such systems, utilized in fields not related to the problem of condensation at freezer doors, have addressed the problem of erratic temperature readings by artificially cooling the temperature sensors while heaters are powered on to counter the affect. This approach, however, is not feasible in large commercial freezer display installations where size and space are limited and where the cost for such counter measures are not easily absorbed (and not likely to be tolerated). Finally, most heretofore known systems employing dew point sensors for condensation control remain reactive, not proactively based on anticipation of condensation events. Further improvement could thus still be utilized

Summary of the Invention

The purpose of the apparatus, systems and methods of this invention is to efficiently eliminate door and frame condensation at widely utilized commercial freezer/refrigeration display cases. The invention is proactive in preventing condensation from forming by

activating frame/door heaters before the dew point temperature at frame and door surfaces is reached. Power is then cycled off at a set point above dew point to save energy. This is accomplished by configuring apparatus of this invention to provide highly accurate sensing of frame temperature and dew point by thermally isolating temperature sensors and constantly updating data to reliably provide the ability to accurately anticipate condensation at case surfaces. The invention eliminates door damage and runoff safety hazards due to condensation build-up, efficiently cycles duty time of frame/door heaters thus lowering the installation's energy costs, and requires no expensive countermeasures to maintain accuracy and efficacious performance.

The condensation control apparatus of this invention includes a frame temperature sensing unit adapted for monitoring temperature of either the door or case of a display case. The frame temperature sensing has temperature sensor mounted on a carrier. A dew point sensing unit is adapted for monitoring ambient air temperature and relative humidity outside of the display case and includes a carrier having at least one dew point sensing component thereat.

A control unit is connected with the sensing units and includes a processor connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a preselected set point above a dew point value derived from monitored ambient temperature

and relative humidity. The processor also deactivates the frame/door heater when monitored display case door or frame temperature rises above a second preselected set point above the dew point value. Housing for locating the sensing units includes structure establishing thermal isolation of the sensing units by minimizing heat transfer contacts with the housing. The temperature sensor and the dew point sensing component are located amid insulating air pockets formed by the structure of the housing. The housing and control unit are mountable at the display case.

The system of this invention further includes the sensing and control apparatus located at each display case in an array of display cases. An internal case temperature sensing unit is positionable inside the display case and connected with the control unit processor. The processor stores data related to readings at the sensing units and operation of the frame/door heater, and a communication control unit associated with the processor enables coordination of programming and data download access to the processor.

The method of this invention is for condensation control at a refrigerated display case having at least one door, a frame and at least one frame/door heater. The steps of the method include placing a temperature sensing unit in contact with the display case frame to monitor case frame temperature and mounting a dew point sensing unit on the display case to monitor ambient air temperature and relative

humidity outside the display case. The monitored case frame temperature, ambient air temperature and relative humidity are utilized to anticipate formation of condensation at the display case and activate and deactivate the frame/door heater responsive thereto.

It is therefore an object of this invention to provide apparatus, systems and methods for efficient elimination of door and frame condensation at widely utilized commercial freezer/refrigeration display cases.

It is another object of this invention to provide apparatus, systems and methods for elimination of door and frame condensation at freezer/refrigeration display cases that proactively prevents condensation from forming by activating frame/door heaters before dew point temperature at frame and door surfaces is reached.

It is still another object of this invention to provide apparatus for efficient elimination of door and frame condensation at freezer/refrigeration display cases that are configured to accurately sense frame temperature and dew point by thermally isolating temperature sensors and that are constantly data updated to reliably provide the ability to accurately anticipate condensation at case surfaces.

It is yet another object of this invention to provide apparatus, systems and methods utilized with freezer/refrigeration display cases that eliminate door damage and runoff safety hazards due to condensation build-up, efficiently cycle duty time of frame/door heaters thus

lowering the installation's energy costs, and require no expensive countermeasures to maintain accuracy and performance of the apparatus and systems.

It is another object of this invention to provide condensation control apparatus for a refrigerated display case having at least one door, a frame and at least one frame/door heater, the apparatus including a frame temperature sensing unit adapted for monitoring temperature of one of the display case door or display case frame and including a carrier having a temperature sensor thereat, a dew point sensing unit adapted for monitoring ambient air temperature and relative humidity outside of the display case and including a carrier having at least one dew point sensing component thereat, a control unit connected with the sensing units and including processing means connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a preselected set point above a dew point value derived from monitored ambient temperature and relative humidity, and housing means for locating the sensing units including structure establishing thermal isolation of the sensing units by minimizing heat transfer contacts between the sensing units and the housing means and locating the temperature sensor and the at least one dew point sensing component amid insulating air pockets formed by the structure of the housing means.

It is still another object of this invention to provide a system for condensation control at an array of refrigerated display cases, the cases each having at least one door, a frame and at least one frame/door heater, the system including sensing and control apparatus configured for location at each display case in the array of display cases, the apparatus including a frame temperature sensing unit adapted for mounting at the display case for monitoring temperature of one of the display case door or display case frame, a dew point sensing unit adapted for mounting at the display case for monitoring ambient air temperature and relative humidity outside of the display case, an internal case temperature sensing unit positionable inside the display case, and processing means mountable at the display case and connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a first preselected set point above a dew point value derived from monitored ambient temperature and relative humidity, for deactivating the frame/door heater when monitored display case door or frame temperature rises above a second preselected set point above the dew point value, and for storing data related to readings at the sensing units and operation of the frame/door heater, and a communication control unit associated with the processing means for coordinating programming and data download access to the processing means of the apparatus.

It is yet another object of this invention to provide a method for condensation control at a refrigerated display case having at least one door, a frame and at least one frame/door heater, the method including the steps of placing a temperature sensing unit in contact with the display case frame to monitor case frame temperature, mounting a dew point sensing unit on the display case to monitor ambient air temperature and relative humidity outside the display case, and utilizing monitored case frame temperature, ambient air temperature and relative humidity to anticipate formation of condensation at the display case and activating and deactivating the frame/door heater responsive thereto.

With these and other objects in view, which will become apparent to one skilled in the art as the description proceeds, this invention resides in the novel construction, combination, and arrangement of parts and method substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that changes in the precise embodiment of the herein disclosed invention are meant to be included as come within the scope of the claims.

Brief Description of the Drawings

The accompanying drawings illustrate a complete embodiment of the invention according to the best mode so far devised for the practical application of the principles thereof, and in which:

FIGURE 1 is a diagrammatic illustration of one embodiment of the condensation prevention apparatus and system of this invention;

FIGURE 2 is an exploded view of the local controller unit of the apparatus of this invention;

FIGURE 3 is a perspective view of the case temperature sensor and housing of the apparatus of this invention;

FIGURE 4 is an exploded view of the sensor/housing of FIGURE 3;

FIGURE 5 is a sectional view of the sensor/housing of FIGURE 3;

FIGURE 6 is an illustration showing positioning of the sensor/housing of FIGURE 3;

FIGURE 7 is an exploded view of the dew point sensor and housing of the apparatus of this invention;

FIGURE 8 is a reverse exploded view of the sensor/housing of FIGURE 7;

FIGURE 9 is an illustration showing positioning of the sensor/housing of FIGURE 7;

FIGURE 10 is an exploded view of an alternative locational, housing and mounting configuration for the sensors/housings illustrated in FIGURES 3 and 7;

FIGURE 11 is a sectional illustration of the sensors/housing of FIGURE 10 in a first mounting;

FIGURE 12 is an illustration showing positioning of the sensors/housing of FIGURE 10 in an alternative mounting;

FIGURE 13 is an electronics block diagram of the apparatus of this invention;

FIGURES 14a through 14j are flow diagrams illustrating program control of local controller components and communications modules of the apparatus of this invention; and

FIGURES 15a through 15g are flow diagrams illustrating program control at centralized processing (an on- or off-site personal computer for example).

Description of the Invention

The system of this invention is illustrated in FIGURE 1 in association with a common commercial freezer/cooler display unit 21 including a display container 23 having a frame (not shown in this FIGURE) and doors 25 in frame 27 (hereinafter, refrigeration case(s)). Up to fifteen such cases 21 can be served by the system as currently configured (though greater or fewer cases could be accommodated). Each case 21 is provided with a local controller unit 31 connected with an array of case sensors including internal case temperature sensor 33, external case frame temperature sensor 35 and dew point sensor 37. The array of sensors may be hard wired (as shown herein) to unit 31 at each case 21 through frame members, or may be configured to function wirelessly utilizing known technologies. While separate frame temperature and dew point sensors 35 and 37 are shown in this FIGURE, an alternate configuration that combines

both sensors into one housing is shown hereinafter. Sensor mounting positions may be selected as desired, though the configuration illustrated in FIGURE 1 is preferred where the sensors are separately housed.

Controller unit 31 is illustrated in FIGURE 2. AC power connector 41, switching relay 43, transformer 45, internal case temperature sensor connection (an RJ-22 connector for example) 47, frame temperature sensor and dew point sensor connectors (RJ-11 type connectors, for example) 49 are located on circuit board 51. Microprocessor 53 is located on board 51, as are in-coming and out-going connectors 55 (RJ-45 type connectors, for example) utilized so that a number of serially connected control units 31 are connectable with a single communication board/transmitter/receiver 57 in communication with receiver/transmitter/centralized processing 59 (FIGURE 1). LED's 65 and 67 (preferably green and red, respectively) on board 51 flash to indicate a status update from central processing 59 to microprocessor 53 (LED 65) and to indicate that relay 43 has switched power on to frame/door heaters (LED 67). Reset/programming interface 71 is mounted between LED's 65/67 at board 51.

Board 51 is maintained in housing 75 including first and second housing portion 77 and 79, respectively, with all connectors, LED's and user interfaces provided with access openings therethrough. Housing 75 is configured to be mounted between freezer door frame mullions where case

lighting is typically located (thus providing AC power routing access). The housing is designed to be less than the height and width of a typical heretofore known and utilized mullion lighting lens cover adapted for such cases 21.

Controller unit microprocessor 53 can be calibrated to initiate operations anywhere above or below calculated dew point. Adjustments can be made from central processing 59 with wireless communication via the communications board/transmitter/receiver 57 connected to controller unit 31. Central processing 59 (a PC for example) receives data from units 31 via communications board/transmitter/receiver 57, including data enabling tracking, storing and making available reports of the history of ambient air temperature and humidity from dew point sensor 37, case frame and internal case temperatures from sensors 35 and 33, respectively, and power consumption of door heaters (all as shown herein in FIGURES 15). This information can be used to improve energy efficiency by recalibrating operating ranges of the apparatus and system of this invention, as well as for improved operational cost accounting.

The internal case temperature must remain below FDA approved levels or food will spoil, such being both a health concern as well as an expense to the installation for potential loss of goods. It has heretofore been difficult to determine if temperature are within guidelines 24 hours a day. Utilization of the apparatus and system of this invention, however, and particularly utilization of internal

case temperature monitoring by sensor 33 through controller unit 31, allows such detailed tracking and reporting. Moreover, the apparatus and system are configured to automatically send an alarm (one or both locally and by autodialer to a responsible technician) if maximum allowable internal case temperature as programmed is exceeded. If central processing 59 receives an alarm message from any of the local control units 31 in the system, an alarm or auto dial via a modem is initiated and a message is sent with regard thereto, including the exact case in the system wherein temperature has deviated (see FIGURES 14 and 15).

Temperature sensors 33 and 35 are similar and are housed as illustrated in FIGURES 3 through 6 (for purposes of description herein, only the housing of sensor 35 will be described since sensor 33 is much simpler to implement and maintain). Temperature sensor 35 housing 83 includes cover 85, sensor locating base 87 and circuit board/carrier 89 locating temperature sensor 35 including temperature sensing chip 91 at one surface thereof. This assembly is mounted to case frame unit or door frame unit 93 of display case 21 utilizing screws or adhesive, with base 87 adjacent frame unit 93 as shown in FIGURE 5. Cabling from controller unit 31 is routed through cable protector 95 at base 87.

Temperature sensing chip 91 is located on board/carrier 89 so that when received in housing 83 it is located through sensor opening 99 at base 87. With proper materials sizing, chip 91 will be in direct contact with the surface of unit

93 being monitored when base 87 is mounted on frame unit 93. Housing 83 should be located at the coldest spot on the exterior of the freezer. That spot is usually in the center of the case between the bottom of a door 25 and door or case frame unit 93 (see FIGURE 6). Door and frame heaters 103 are located inside doors and/or frames of cases 21.

Housing 83 is configured at cover 85 and base 87 to thermally isolate sensing chip 91 from the warming effects of ambient air temperature in the vicinity of the chip and transfer thereof by the housing to the chip. Air space pockets 105 and 107 above and around chip 91, respectively, and limited housing contact (see FIGURE 5 wherein only a single locating post 109 maintains board/carrier 89 at its position in housing 83) isolate chip 91 from the housing. By thus configuring board/carrier 89 (made typically of FIBERGLASS material) and housing 83 (preferably made of plastic such as acrylonitrile butadiene styrene polycarbonate) little transfer of heat to sensor chip 91 occurs, assuring accurate measurement of surface temperature of unit 93 unaffected by inaccuracies introduced as artifact into the measurement by ambient air temperature conditions in the vicinity of housing 83 (accuracy of frame temperature measurements has been documented by testing to be within 1 or 2 degrees Centigrade).

Air space pocket 105 is created by the depth of cover 85 adjacent board/carrier 89, the cover also insulating the sensor chip from the ambient. Air space pocket 107 is

created by opening 99 having an opening area greater than surface area of chip 91. These improvements allow accurate tracking and monitoring of case frame temperature, used not only for precisely timed heater activation, but also for better timing of heater deactivation given the fast rise in frame temperature after frame/door heaters 103 are activated to prevent condensation.

Turning now to FIGURES 7 through 9, dew point sensor 37 is housed in housing 115 including cover 117 and mounting base 119. Circuit board/carrier 121 maintains sensor 37 circuitry including dew point sensing chip 123. Dew point sensing chip 123 is located, when assembled, in opening 129 in the face of cover 117, opening 129 including protective shield 131 having gaps 133 along the sides thereof to allow airflow over sensing chip 123 for measuring humidity and ambient air temperature. A membrane 141 covers opening 143 at sensing chip 123 to protect internal humidity and temperature sensing components from foreign matter such as cleansers and the like. The design of cover 117 protects membrane 141 without preventing airflow to sensing chip 123.

Housing base 119 includes cabling routing protector 145 for introducing and stabilizing cabling to sensor 37. Spacer ribs 147 at base 119 assure an insulating air gap between housing 115 and its adjacent mounting surface. Housing 115 is preferably mounted to door or case frame unit 151 located at the top of case 21, as shown in FIGURE 9, and between the

frame unit and door 25 so that the cold air exiting the case when a door is opened will not affect the sensor readings.

Housing 115 is configured to thermally isolate dew point sensor 37 so that accuracy of the dew point sensor is maintained within to 1 to 3 degrees Centigrade. First, by assuring that sensor 37 is held away from the unnaturally heated frame (either cooled by the freezer or heated by frame heaters) with spacer ribs 147, the frame temperature will not influence the relevant dew point readings (primarily ambient air temperature). The air pocket (155 in FIGURE 9) behind board/carrier 121 and extending all the way to the mounting surface at unit 151 prevents thermal transfer through housing 115 from the mounting surface of frame unit 151. The cover includes openings 157 at opposite ends thereof to provide room temperature airflow at air pocket 155 of room temperature air. Housing mounting surface 159 is perpendicular to the dew point sensor board/carrier 121, and may be mounted by screws or (preferably) adhesive.

By thus configuring board/carrier 121 (made typically of FIBERGLASS material) and housing 115 (preferably made of plastic such as acrylonitrile butadiene styrene polycarbonate) little transfer of heat to sensor chip 123 occurs, assuring accurate measurement of ambient air temperature and humidity unaffected by inaccuracies introduced as artifact into the measurement by freezer case 21 frame temperature conditions in the vicinity of housing 115. Housing 115 is configured utilizing board support

protrusions 163 defining retainer pockets 165 having minimal contact surface along the outer edges of board/carrier 121 to maintain board positioning, thus further reducing thermal transfer. Depth of housing 115 behind pockets 165 establishes air pocket 155.

When door and frame heaters are activated it is important that they do not affect the reading from sensor 37 of actual room air temperature. This design sufficiently isolates sensor 37 from door and frame temperature swings, thereby preserving accuracy of readings of ambient air temperature and thus accuracy of dew point calculation. Absent such thermal isolation, it is possible for shut-off of heaters to be delayed indefinitely. For example, under the influence of heaters, if temperature readings were to rise at an insufficiently isolated dew point sensor then calculated dew point would increase. In such case, the doors would have to be heated further as the dew point is chased. Heating the doors further would raise the dew point still more in this scenario, thereby beginning an upwardly spiraling cycle until the heaters reach their maximum temperature and finally power off.

Turning now to FIGURES 10 through 12, an alternative embodiment for sensors 35 and 37 housing is illustrated wherein housing 115 is utilized to house both sensors. Thus all elements of the housing as heretofore described are the same unless otherwise specified hereinbelow. Sensor 35 is maintained at cabling routing protector 145 at retainer

pockets 175 (one on each side, though only one side is shown in the drawings) defining ledges having minimal contact surface with board/carrier 89 to maintain the board, thus reducing thermal transfer through the housing to the board. A single locating post 177 may be utilized to further stabilize the board if necessary. As shown in FIGURE 11, sensor 91 and board/carrier 89 are completely surrounded by an insulating dead air pocket established by the depth of protector 145. This housing may be mounted either above (FIGURE 11) or below (FIGURE 12) door 25 of a case 21, and retains all the thermal isolation advantages discussed for the individually housed units as discussed above.

FIGURE 13 illustrates the electronics utilized by the apparatus of this invention. Incoming AC power is provided to relay 43 and is transformed at input/transformer 41/45 (12 volt DC output) for use by controller unit 31 and sensors 33, 35 and 37. Sensors 33 and 35 inputs are A/D converted and input to the central processing unit microprocessor 53 embodying the various comparitors and look up tables utilized (Sensor 37 is A/D converted at the sensor). LED's 65/67 are controlled in response to microprocessor functions, and microprocessor programming can be conducted on-site through connector/interface 71. Communications flow between microprocessor 53 and central processing 59 is monitored and controlled by communications board 57 in cooperation with microprocessor 53 and central processing 59. Relay activity is monitored and controlled

by microprocessor 53 in response to set point achievement as specified in software and as sensed by the sensor array.

Thermal isolation of sensors 35 and 37 thus insure the accuracy of the sensors and thus the efficacy of the apparatus both in terms of its ability to anticipate condensation formation as well as its ability to save on energy expenses due to overheating of doors and frames or improper cycling of heaters. Overall functioning of the apparatus and system of this invention are as illustrated in FIGURES 14a through 14j and 15a through 15q. Heaters are activated just above dew point and thus just before moisture appears on freezer surfaces. Controller unit 31 may utilize any known sensor(s) 37 for monitoring ambient air temperature (for example, thermistors may be utilized for the temperature sensors herein, including by sensors 33 and 35) and relative humidity (capacitive polymer or thin film type sensor, for example, may be utilized wherein capacitance is proportional to the relative humidity of surrounding air). Combination sensors providing relatively accurate dew point sensing are known and commercially available. Microprocessor 53 looks up the dew point value from a stored table. Input from monitored dew point sensor 37 and frame temperature sensor 35 are utilized in conjunction therewith to determine when to relay on the frame/door heaters as the frame temperature approaches the dew point (once the monitored frame temperature drops below a preselected set point above the dew point). Once the

monitored frame temperature rises to a preselected set point above the dew point, the heaters are relayed off. On-board software builds a table of over 600 values into the dew point lookup table, set points, as well as other values, being updatable in real time from central processing. The look up table can be reprogrammed through interface 71.

The entire system preferably includes wireless communication for receiving data from multiple control units 31 at different cases 21. Controller unit 31 and communications board/transmitter/receiver 59 transfer data to central processing 59 for data viewing, tracking and report preparation. Central processing 59 is capable of printing efficiency reports, remote recalibration of heater operations and dial up warning programs should any freezer have a failure. Each controller unit 31 tracks internal case temperatures and will warn of unsafe temperatures or freezer failure. Unit/system calibration or recalibration is typically only required when sensors might be influenced by freezer temperatures. Freezer temperatures primarily influence sensor readings dependent on where sensors are mounted at installation. The case frame is not as cold at the top of the freezer as the bottom, so the operating range of the sensors and unit 31 in the combined sensor housing configuration of FIGURE 10 are calibrated for the alternative locations.

WHAT IS CLAIMED IS:

1. Condensation control apparatus for a refrigerated display case having at least one door, a frame and at least one frame/door heater, said apparatus comprising:

a frame temperature sensing unit adapted for monitoring temperature of one of the display case door or display case frame and including a carrier having a temperature sensor thereat;

a dew point sensing unit adapted for monitoring ambient air temperature and relative humidity outside of the display case and including a carrier having at least one dew point sensing component thereat;

a control unit connected with said sensing units and including processing means connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a preselected set point above a dew point value derived from monitored ambient temperature and relative humidity; and

housing means for locating said sensing units including structure establishing thermal isolation of said sensing units by minimizing heat transfer contacts between said sensing units and said housing means and locating said temperature sensor and said at least one dew point sensing component amid insulating air pockets formed by said structure of said housing means.

2. The apparatus of claim 1 wherein said housing means includes a frame temperature sensing unit housing, said frame temperature sensing unit housing including a base and a cover, said cover having a depth creating a first one of said air pockets at one side of said temperature sensing unit and said base including an opening for receiving said temperature sensor therethrough, said opening having an opening area greater than surface area of said temperature sensor thus establishing a second one of said air pockets around said temperature sensor.

3. The apparatus of claim 2 wherein said frame temperature sensing unit housing includes a single locating post at said cover for securing position of said temperature sensing unit relative to said cover.

4. The apparatus of claim 1 wherein said housing means includes a dew point sensing unit housing, said dew point sensing unit housing including a mounting base and cover, said cover including a cover face opening therethrough for receiving said at least one dew point sensing component therein, said cover face opening including a protective shield thereover having air gaps therearound allowing air flow between said protective shield and said cover and thus over said at least one dew point sensing component.

5. The apparatus of claim 4 wherein said cover of said dew point sensing unit housing includes opposite end openings to establish ambient air flow through said dew point sensing unit housing.

6. The apparatus of claim 4 wherein said mounting base of said dew point sensing unit housing includes protrusions establishing retaining pockets receiving said carrier of said dew point sensing unit at outer edges of said carrier and further establishing a first one of said air pockets amid said protrusions and adjacent to said carrier.

7. The apparatus of claim 1 wherein said housing means includes a cover and a base, said cover including a cover face opening therethrough for receiving said at least one dew point sensing component therein, said cover face opening including a protective shield thereover having air gaps therearound allowing air flow between said protective shield and said cover and thus over said at least one dew point sensing component, and said base having depth creating a first one of said air pockets at least at one side of said temperature sensing unit and a second one of said air pockets at one side of said dew point sensing unit.

8. A system for condensation control at an array of refrigerated display cases, the cases each having at least one door, a frame and at least one frame/door heater, said system comprising:

sensing and control apparatus configured for location at each display case in the array of display cases, said apparatus including a frame temperature sensing unit adapted for mounting at the display case for monitoring temperature of one of the display case door or display case frame, a dew point sensing unit adapted for mounting at the display case for monitoring ambient air temperature and relative humidity outside of the display case, an internal case temperature sensing unit positionable inside the display case, and processing means mountable at the display case and connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a first preselected set point above a dew point value derived from monitored ambient temperature and relative humidity, for deactivating the frame/door heater when monitored display case door or frame temperature rises above a second preselected set point above said dew point value, and for storing data related to readings at said sensing units and operation of the frame/door heater; and

a communication control unit associated with said processing means for coordinating programming and data download access to said processing means of said apparatus.

9. The system of claim 8 further comprising a central processing unit and wherein said communication control unit includes a transmitter/receiver for wireless communication with said central processing unit.

10. The system of claim 8 wherein said processing means of said apparatus is separately housed in a housing having dimensions selected so that said housing is mountable between standard door frame mullions provided at the display case.

11. The system of claim 8 wherein said processing means of said apparatus includes a reset/programming interface.

12. The system of claim 8 wherein said frame temperature sensing unit and said dew point sensing unit are mounted together in a housing.

13. The system of claim 8 further comprising housing means for locating said temperature sensing unit and said dew point sensing unit and including structure establishing thermal isolation of said sensing units by minimizing heat transfer contacts between said temperature sensing unit and said dew point sensing unit and said housing means and locating said temperature sensing unit and said dew point sensing unit amid insulating air pockets formed by said structure of said housing means.

14. A method for condensation control at a refrigerated display case having at least one door, a frame and at least one frame/door heater, said method comprising the steps of:

placing a temperature sensing unit in contact with the display case frame to monitor case frame temperature;

mounting a dew point sensing unit on the display case to monitor ambient air temperature and relative humidity outside the display case; and

utilizing monitored case frame temperature, ambient air temperature and relative humidity to anticipate formation of condensation at the display case and activating and deactivating the frame/door heater responsive thereto.

15. The method of claim 14 further comprising thermally isolating said dew point sensing unit from variations in temperature of the display case frame or display case door.

16. The method of claim 14 further comprising thermally isolating said temperature sensing unit from variations in temperature of ambient air.

17. The method of claim 14 further comprising mounting an internal case temperature sensing unit inside the display case and monitoring internal case temperature.

18. The method of claim 17 further comprising storing data related to readings at said sensing units and operation of the frame/door heater.

19. The method of claim 18 further comprising wirelessly accessing said stored data.

20. The method of claim 14 further comprising establishing automated control parameters for the steps of utilizing monitored case frame temperature, ambient air temperature and relative humidity to anticipate formation of condensation at the display case and activating and deactivating the frame/door heater, and wirelessly updating said control parameters.

REFRIGERATION UNIT CONDENSATION PREVENTION

Abstract of the Disclosure

Apparatus, systems and methods are disclosed for efficient elimination of door and frame condensation at widely utilized commercial freezer/refrigeration display cases. The apparatus includes a local controller unit connected with an array of case sensors including an internal case temperature sensor, an external case frame temperature sensor and a dew point sensor. The case frame temperature sensor and dew point sensor are housed to thermally isolate sensing elements thereof from effects of frame temperature changes and ambient air temperature in the vicinity of a sensing element, and to limit heat transfer by the housing to the sensing elements thereby improving sensing accuracy and apparatus performance.

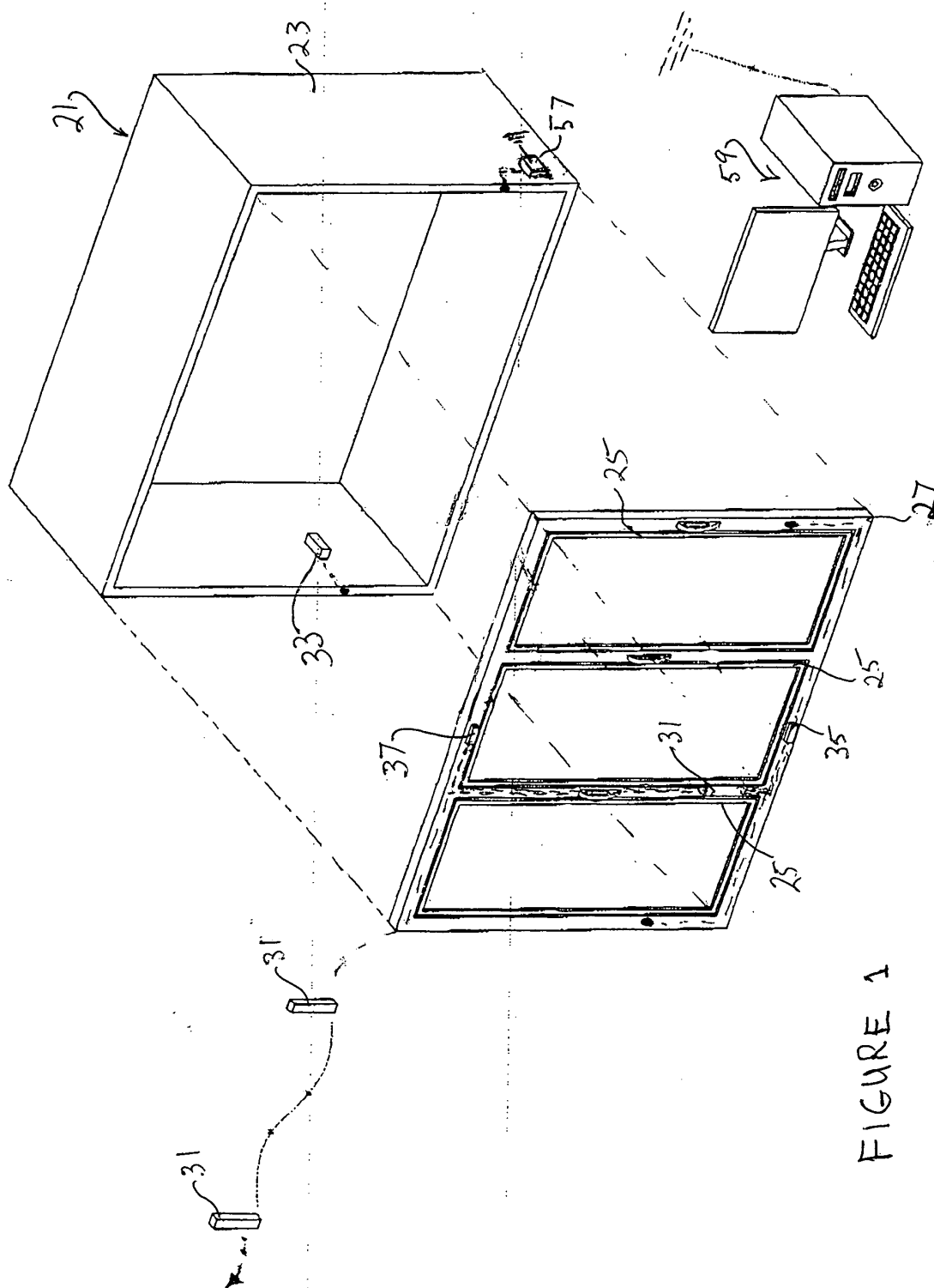


FIGURE 1

BEST AVAILABLE COPY

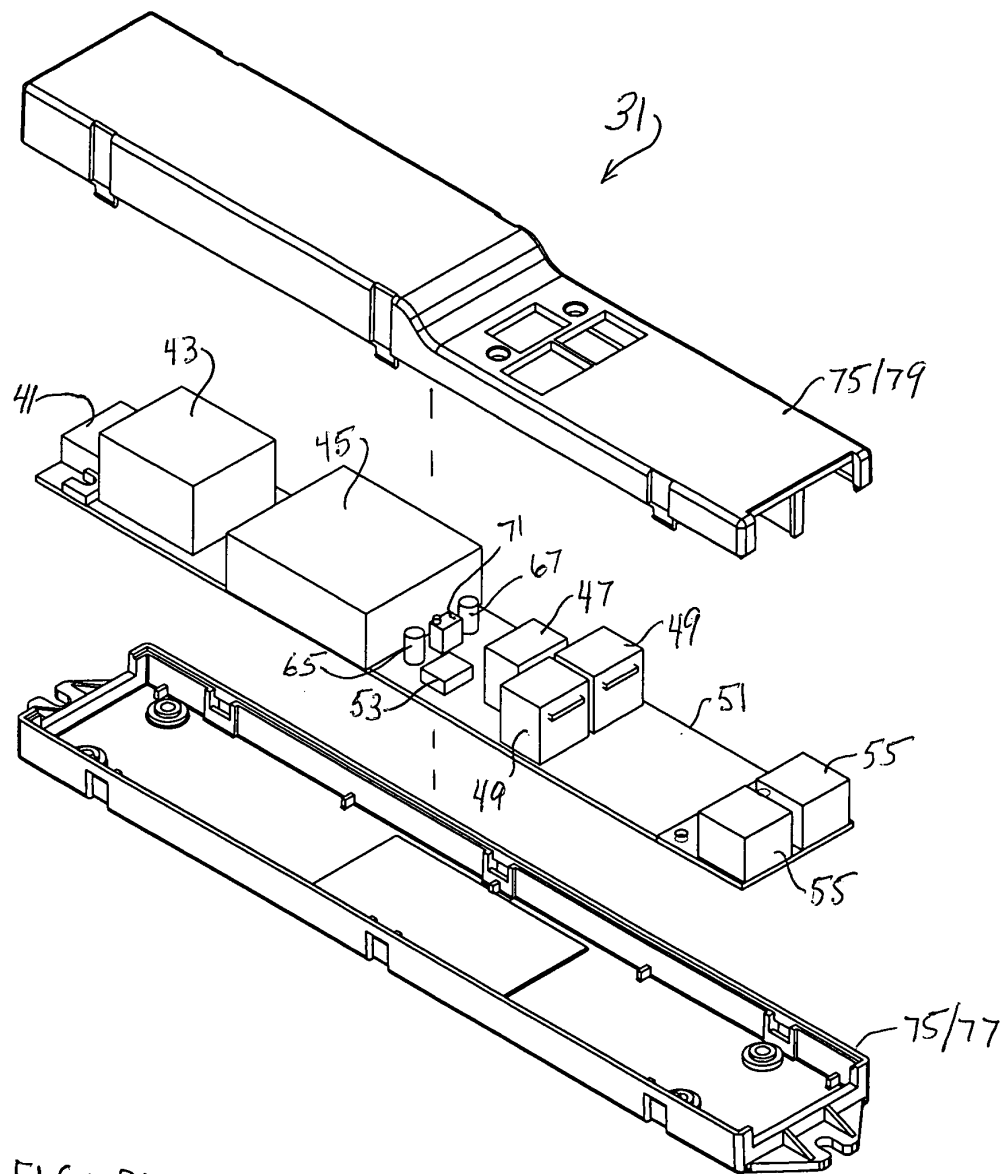


FIGURE 2

FIGURE 3

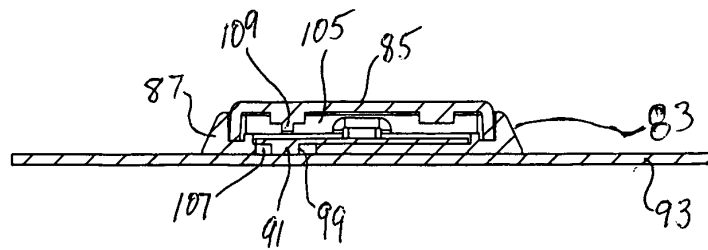
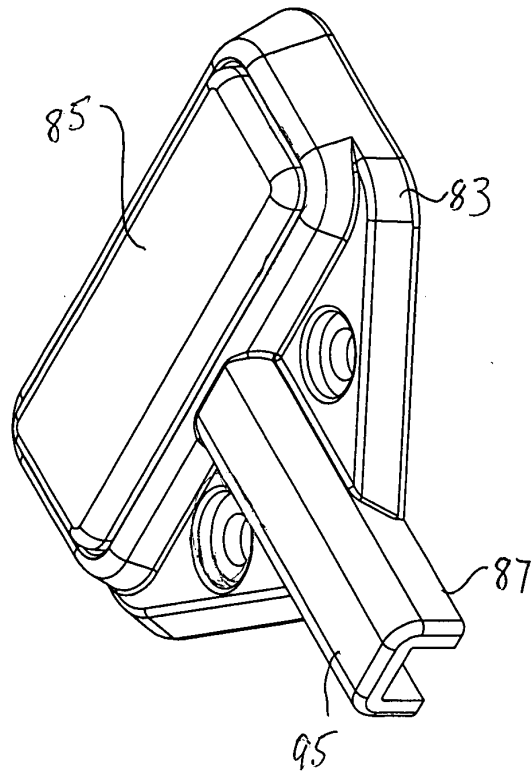


FIGURE 5

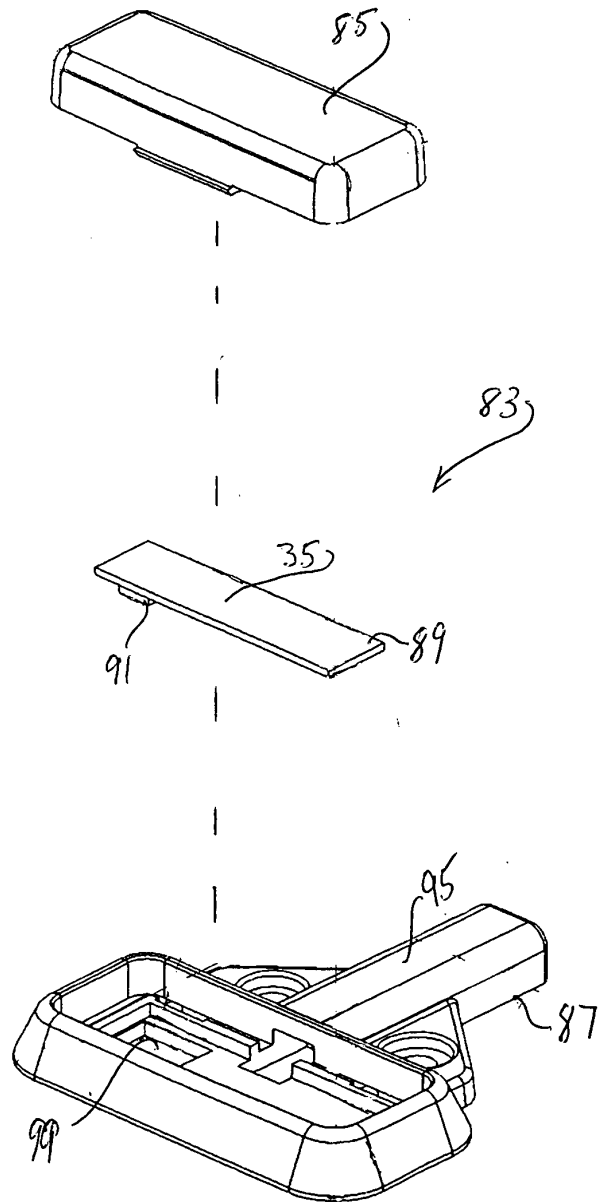


FIGURE 4

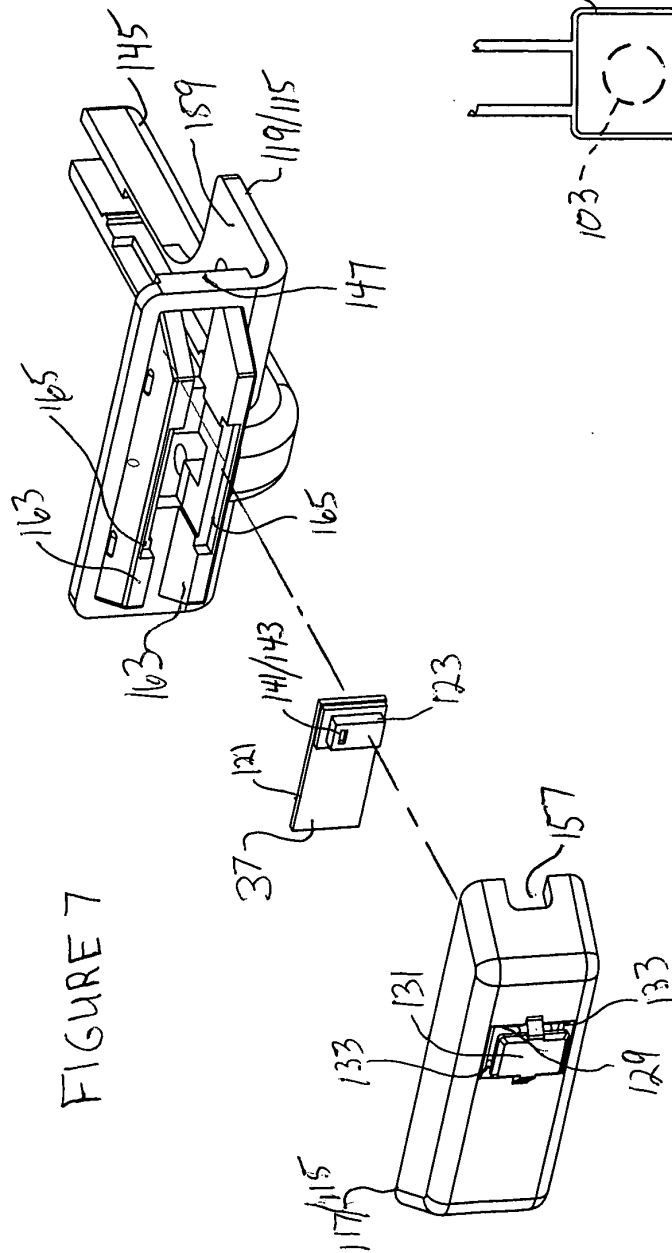


FIGURE 7

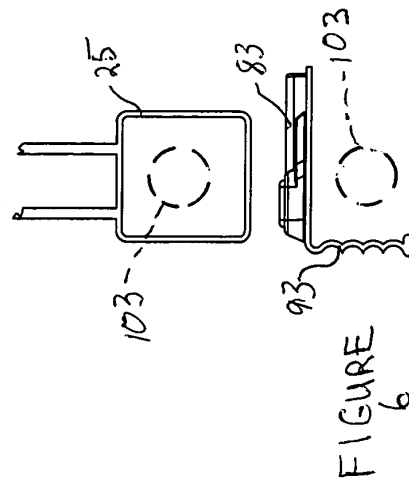
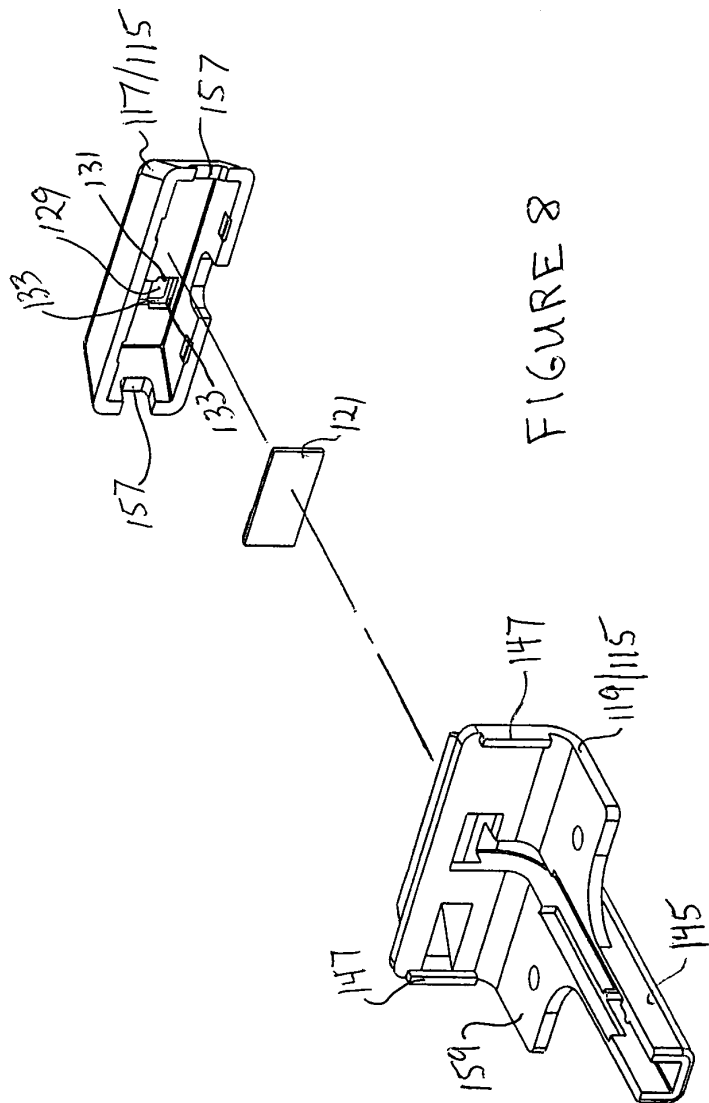


FIGURE 6



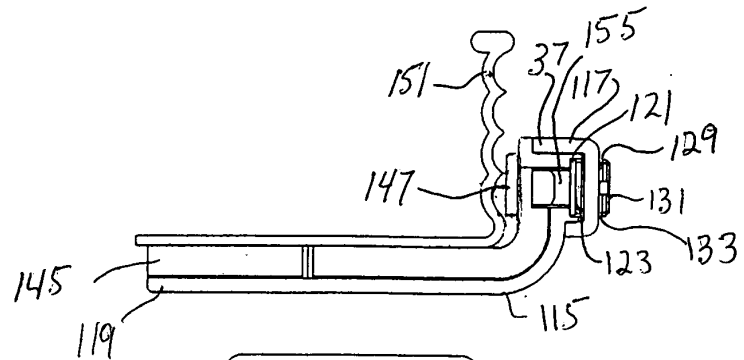


FIGURE 9

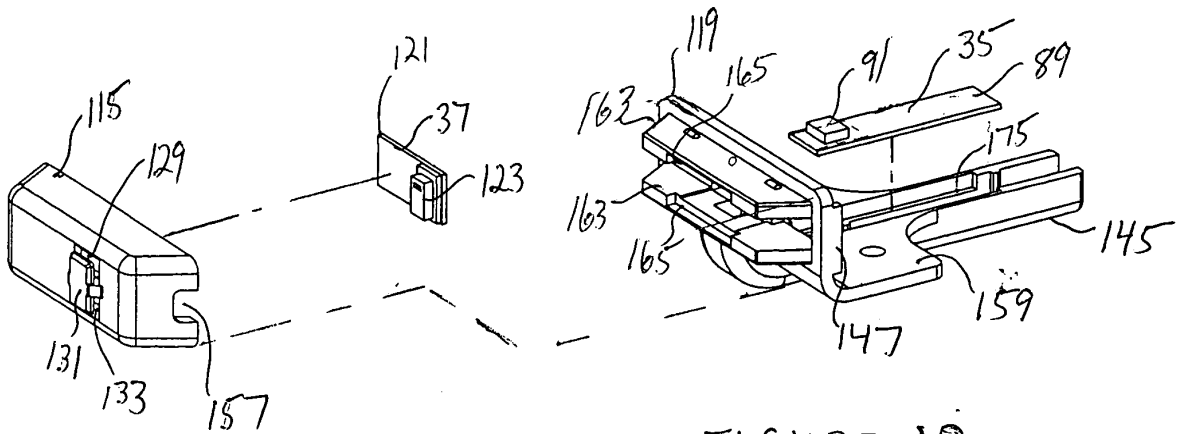
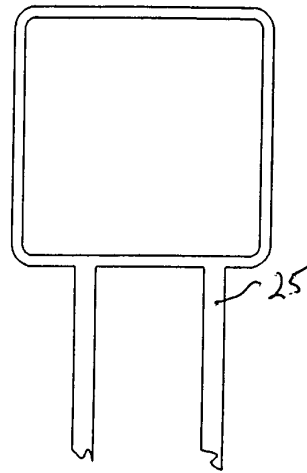
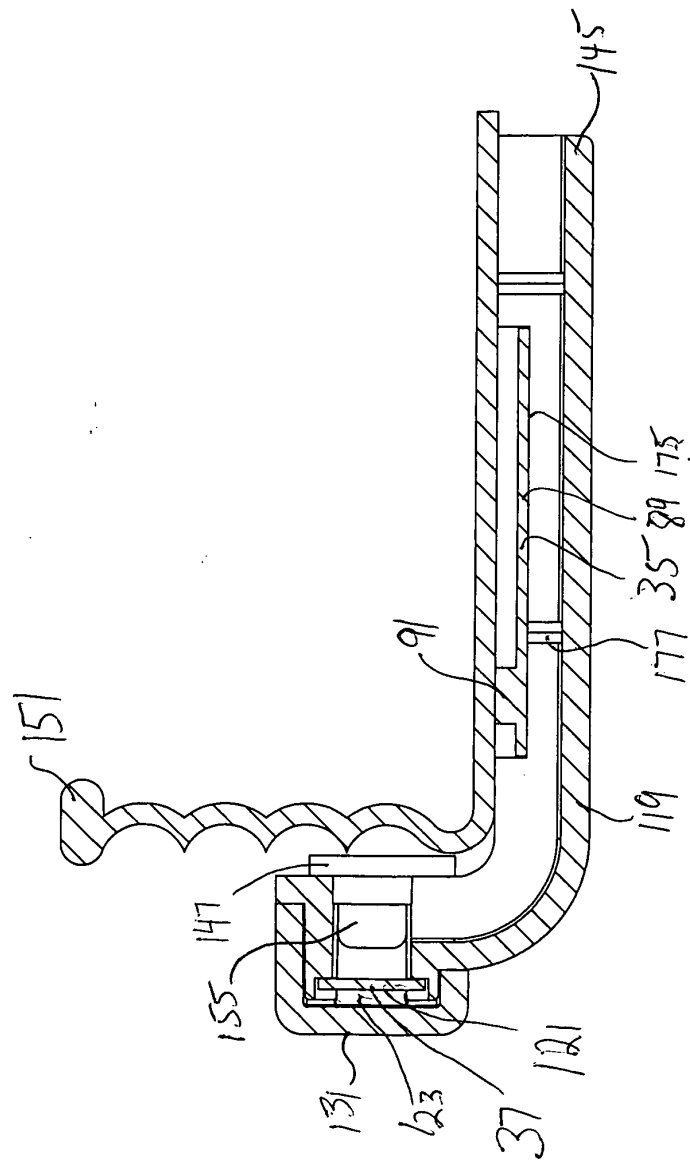


FIGURE 10



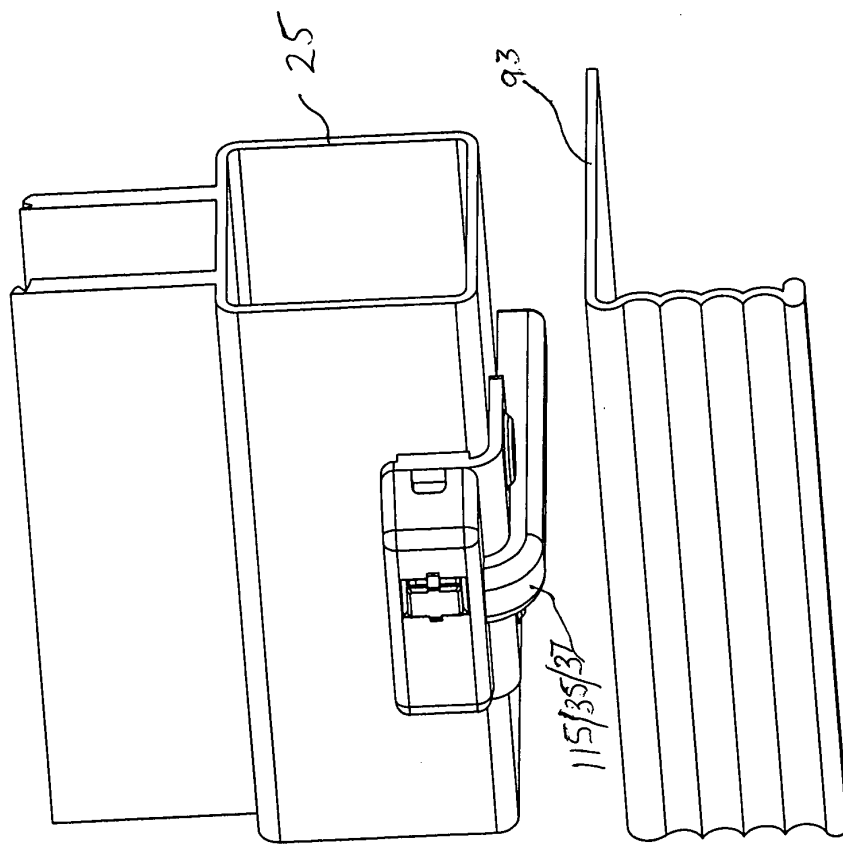


FIGURE 12

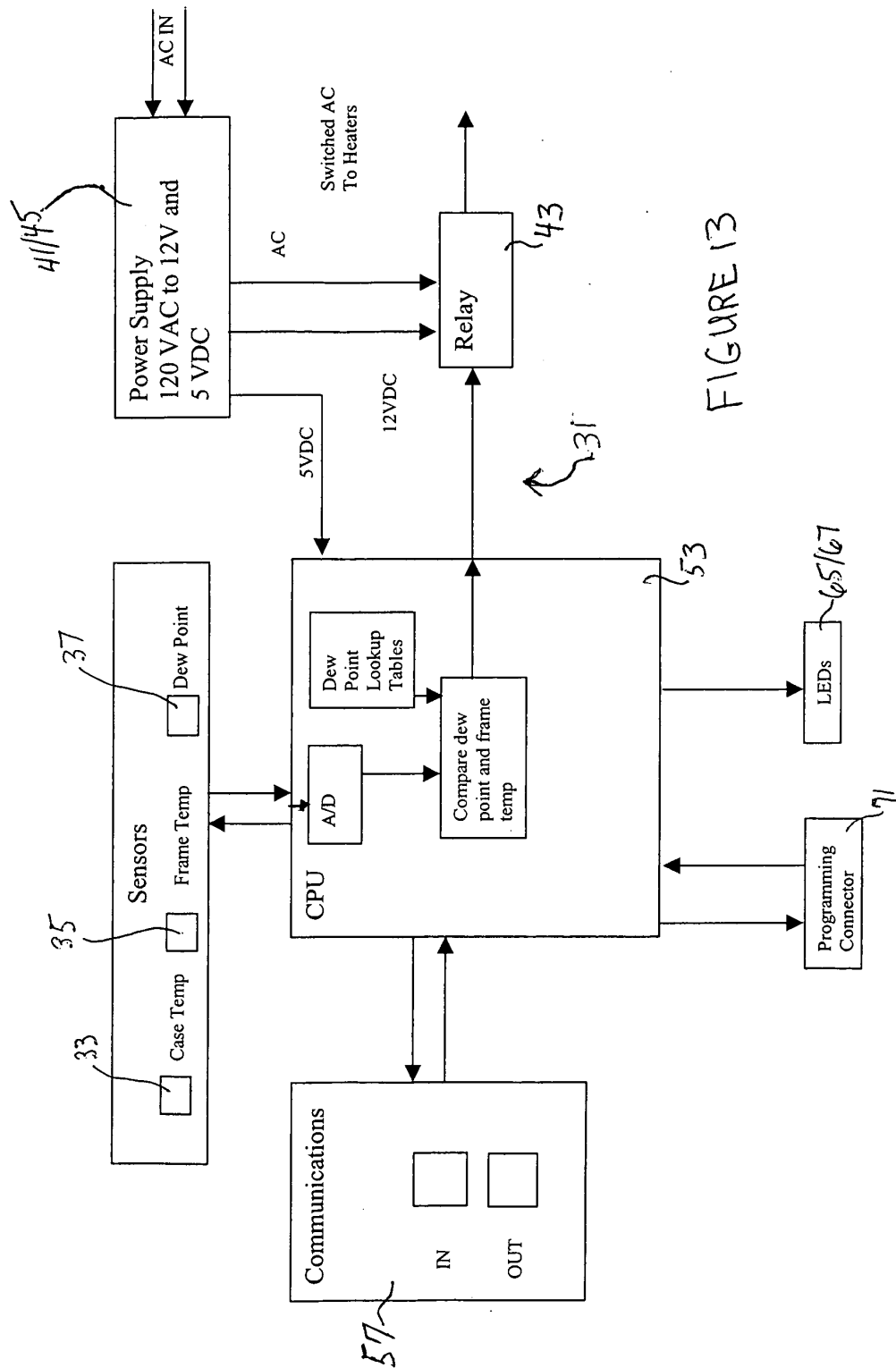


FIGURE 13

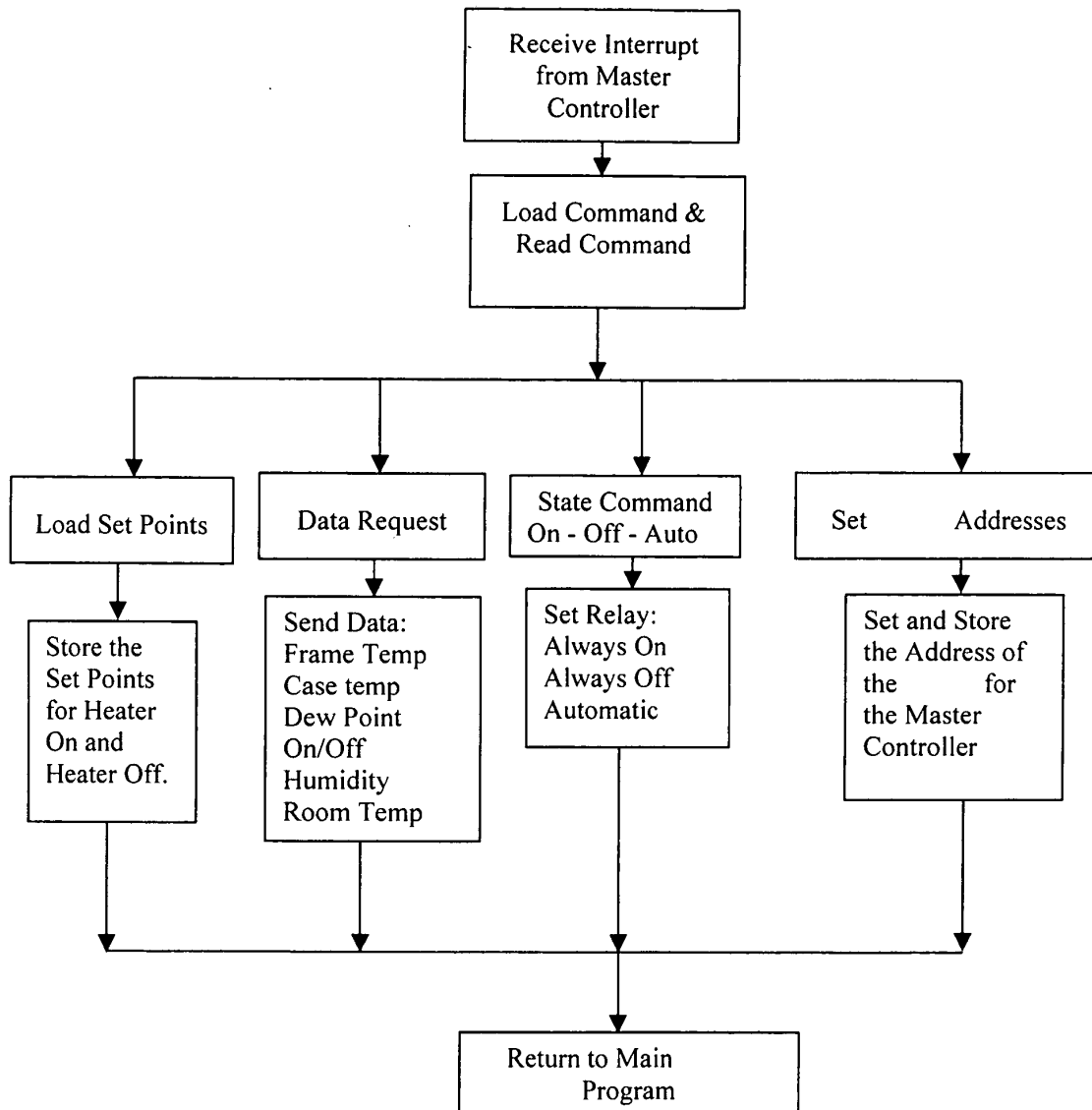
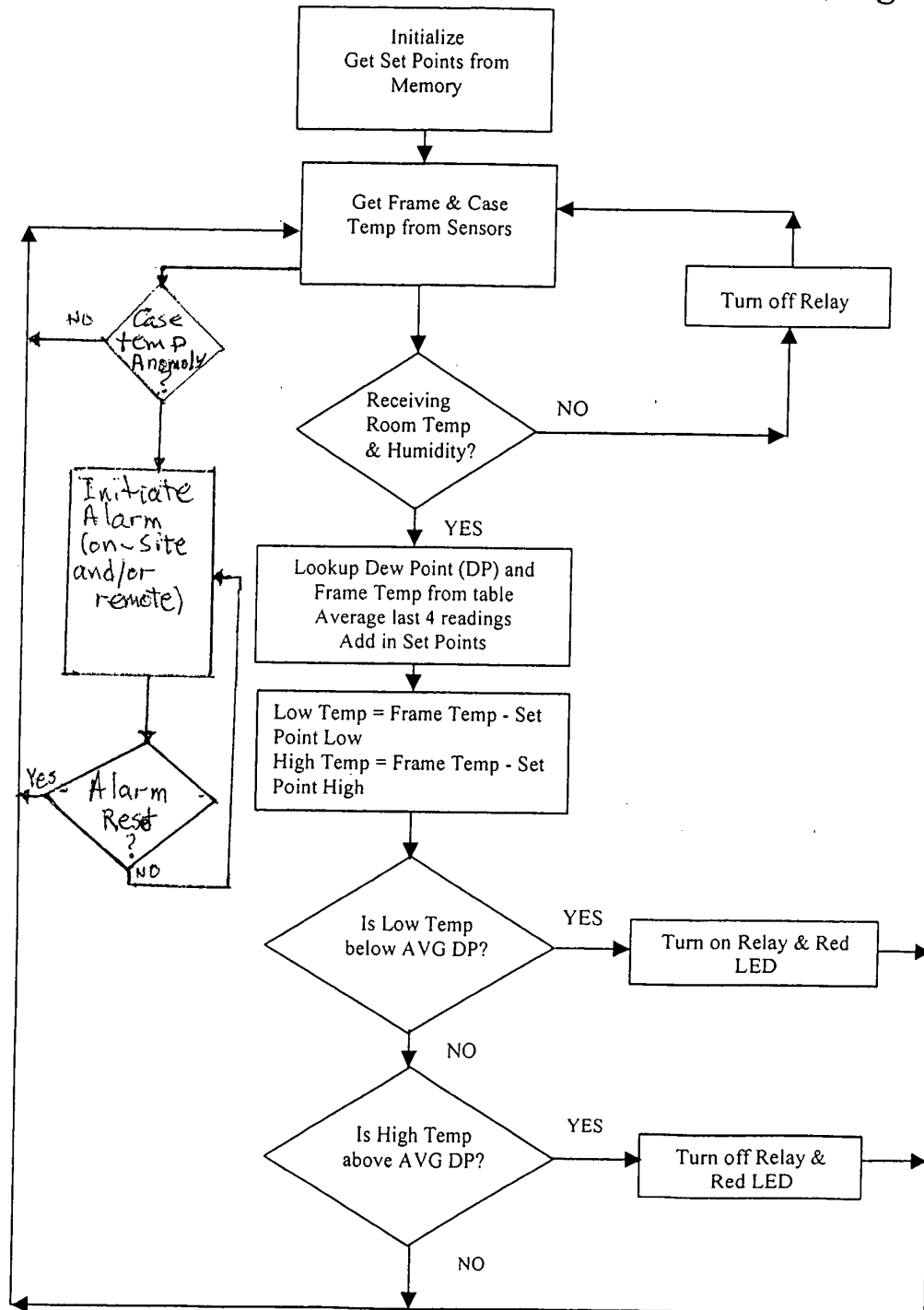


FIGURE 14a

FIGURE 14b



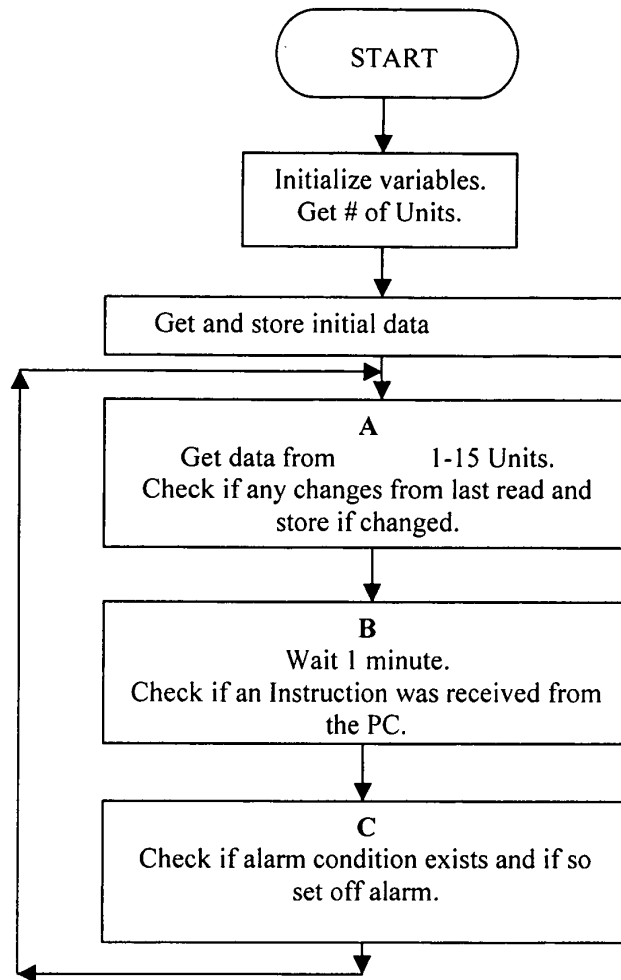


FIGURE 14c

FIGURE 14d

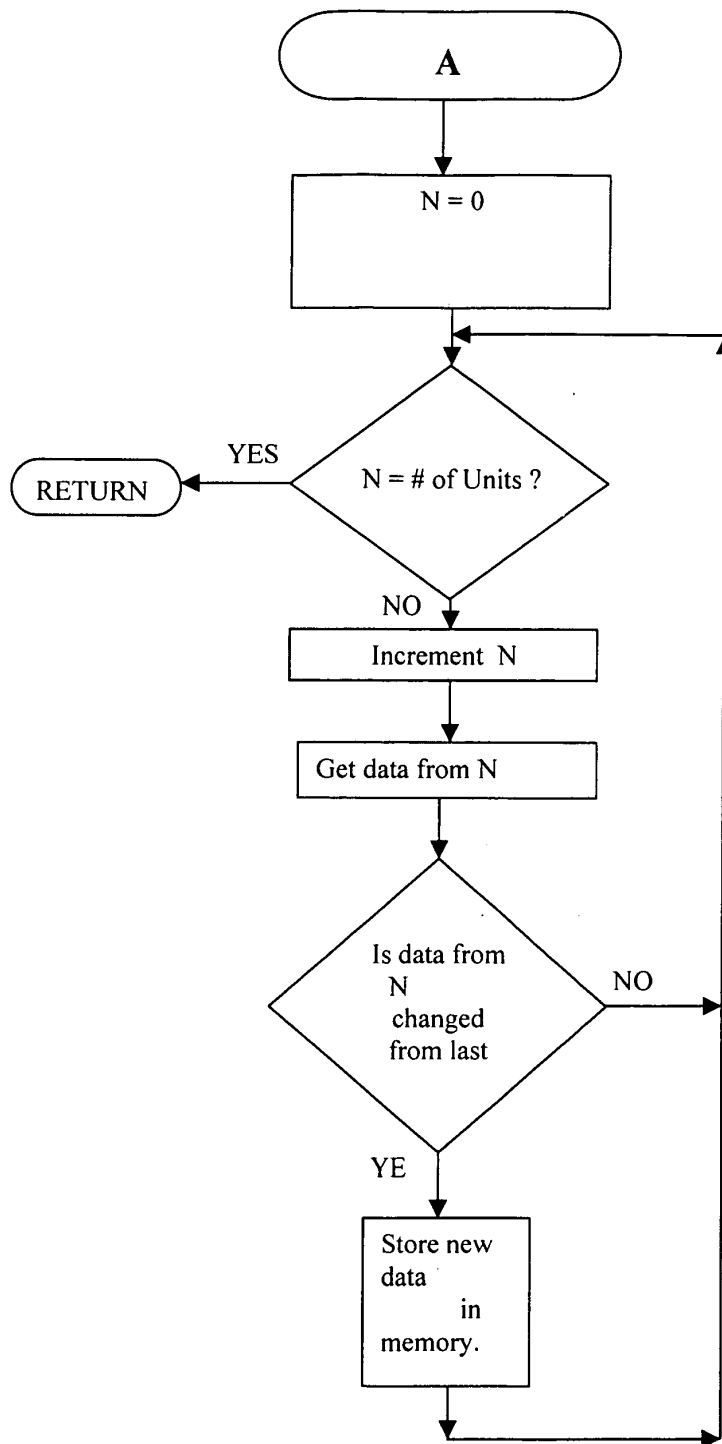
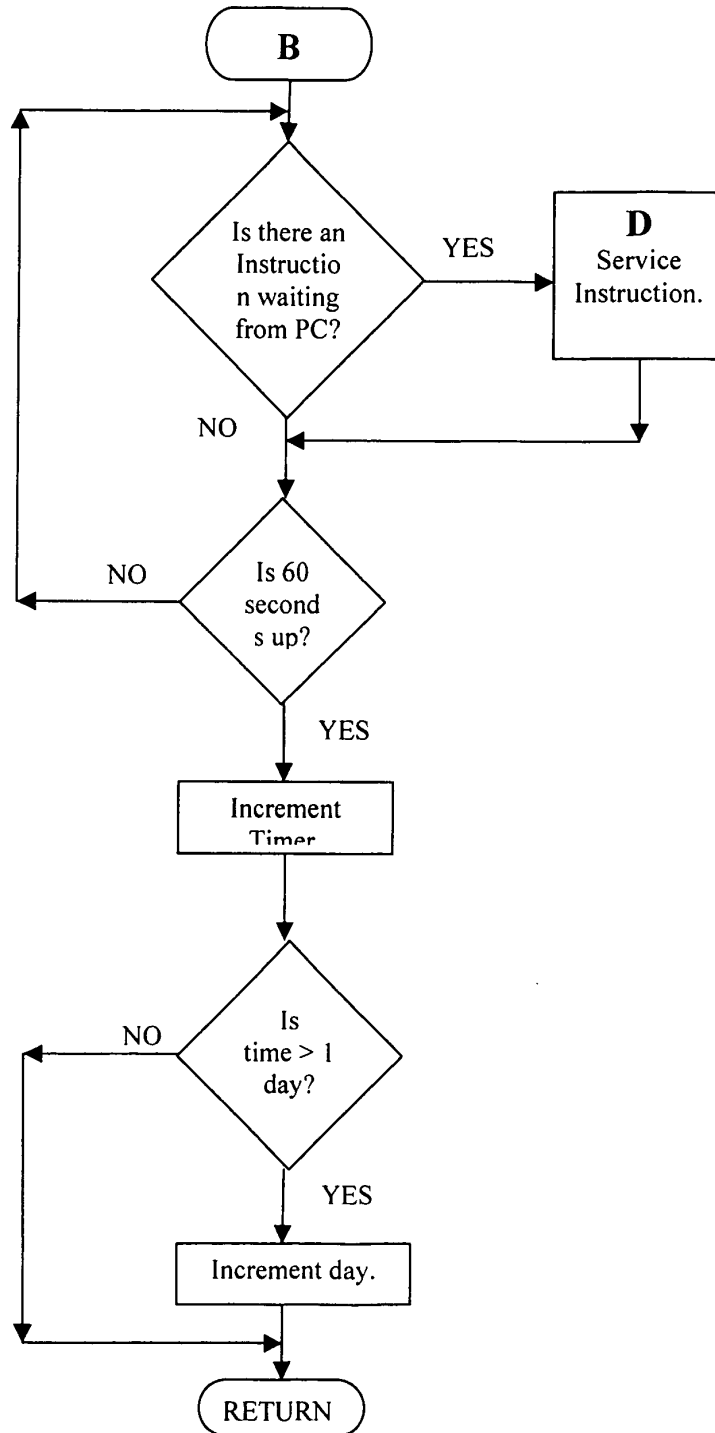


FIGURE 14e



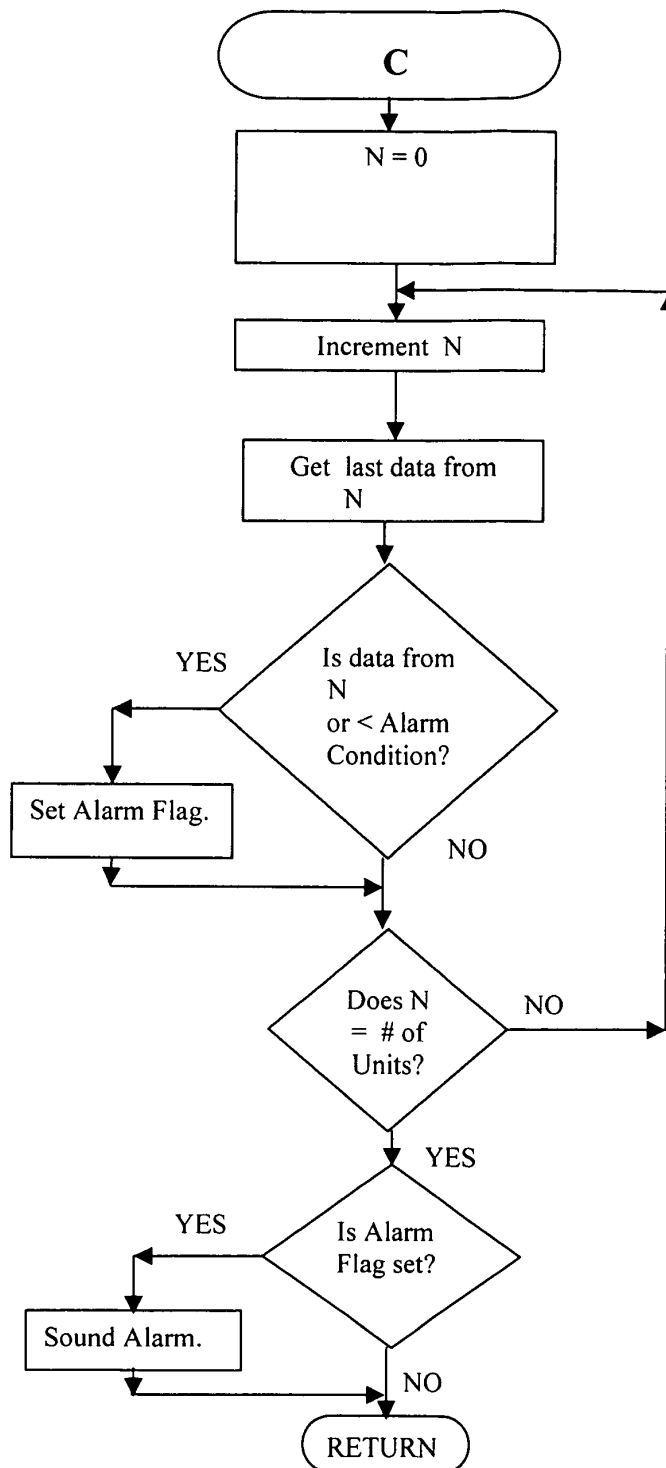


FIGURE 14f

FIGURE 14g

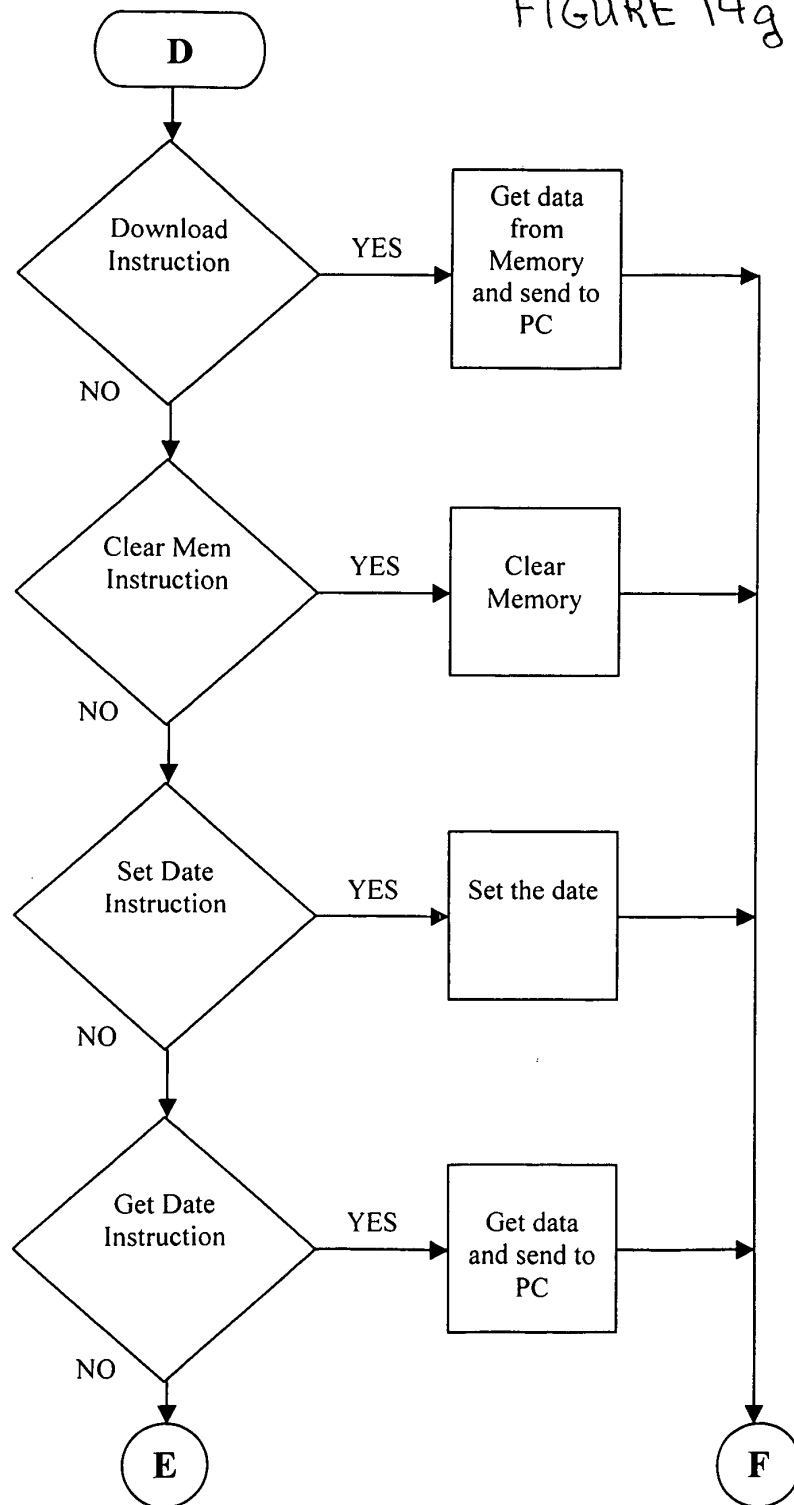


FIGURE 14h

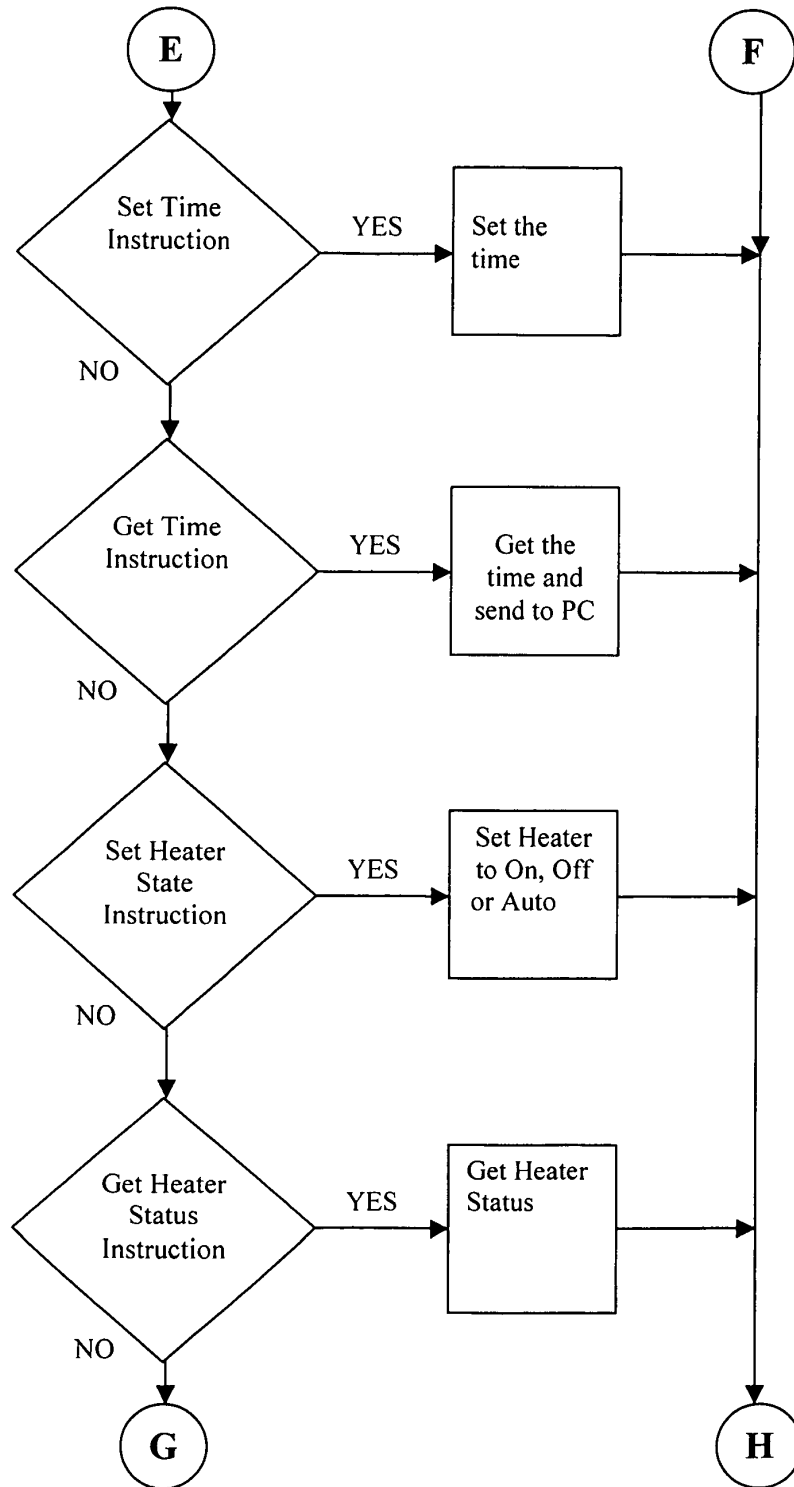
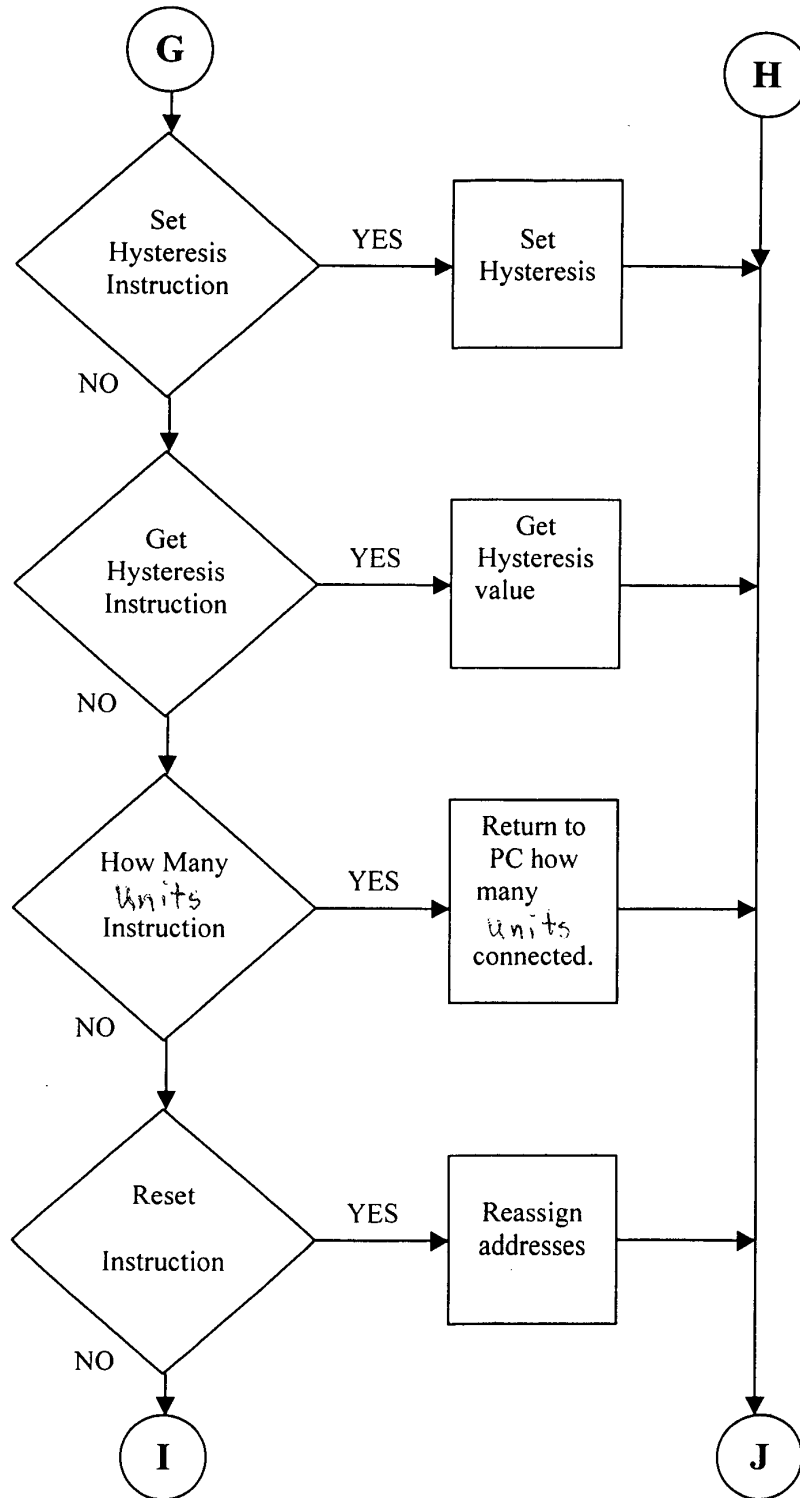


FIGURE 14i



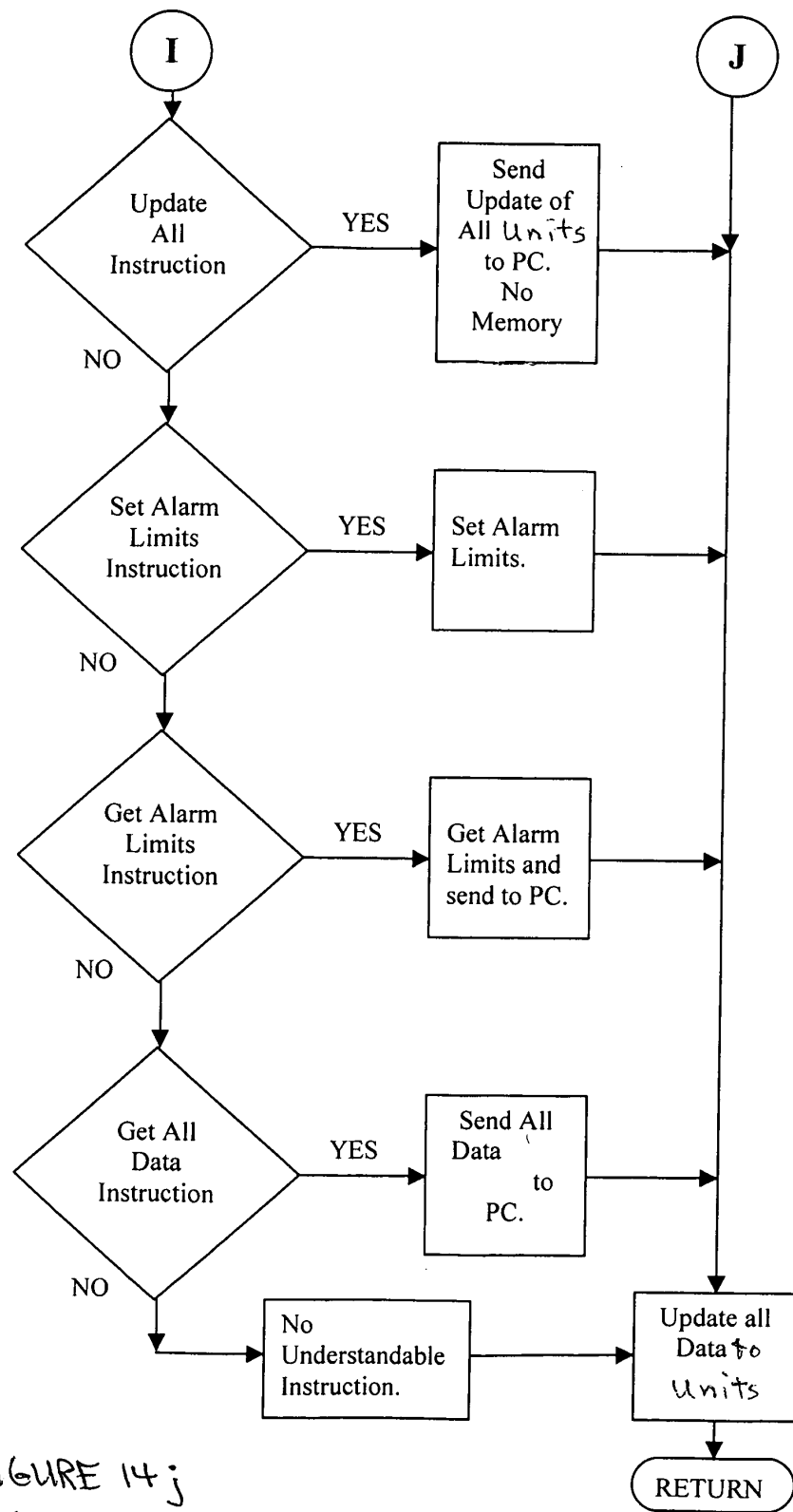


FIGURE 14j

FIGURE 15a

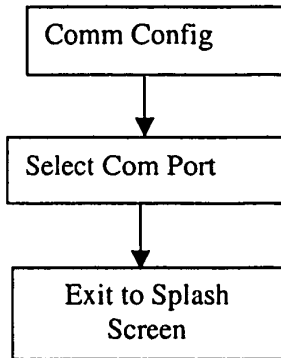


FIGURE 15c

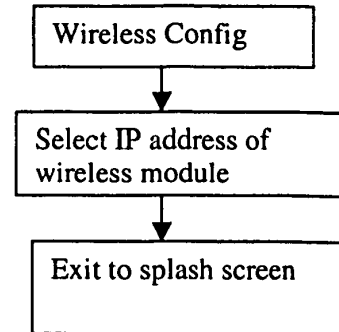


FIGURE 15b

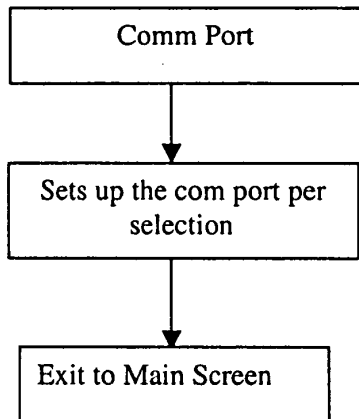


FIGURE 15d

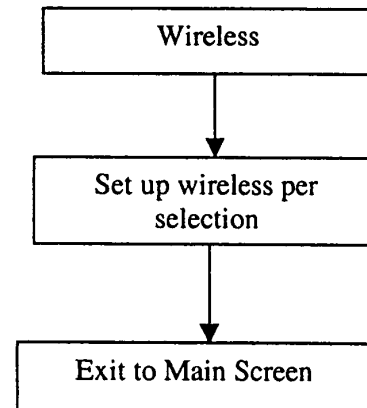


FIGURE 15e

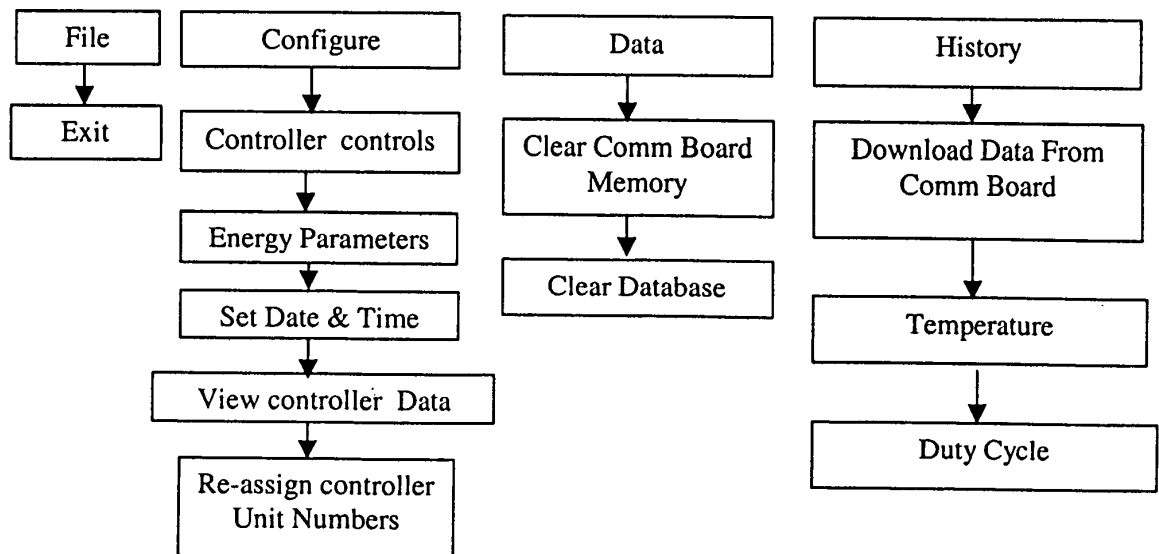
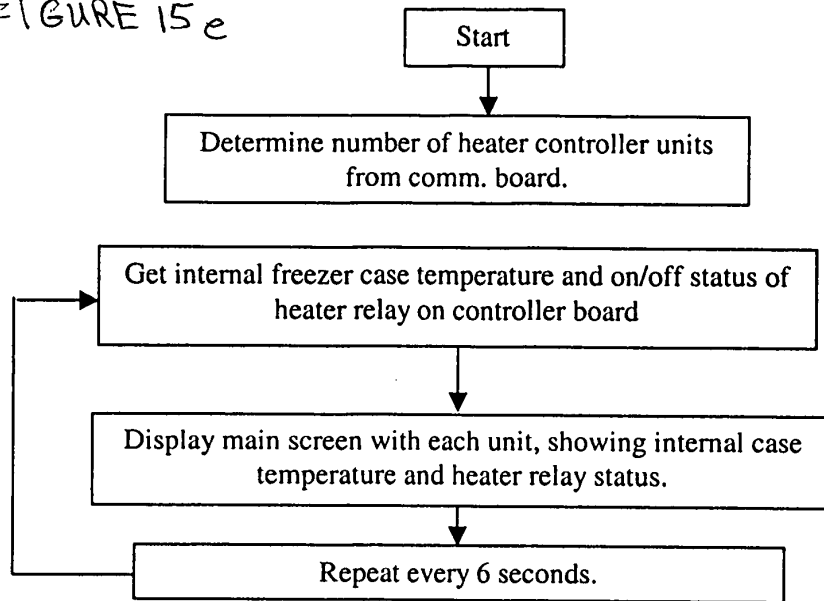


FIGURE 15f

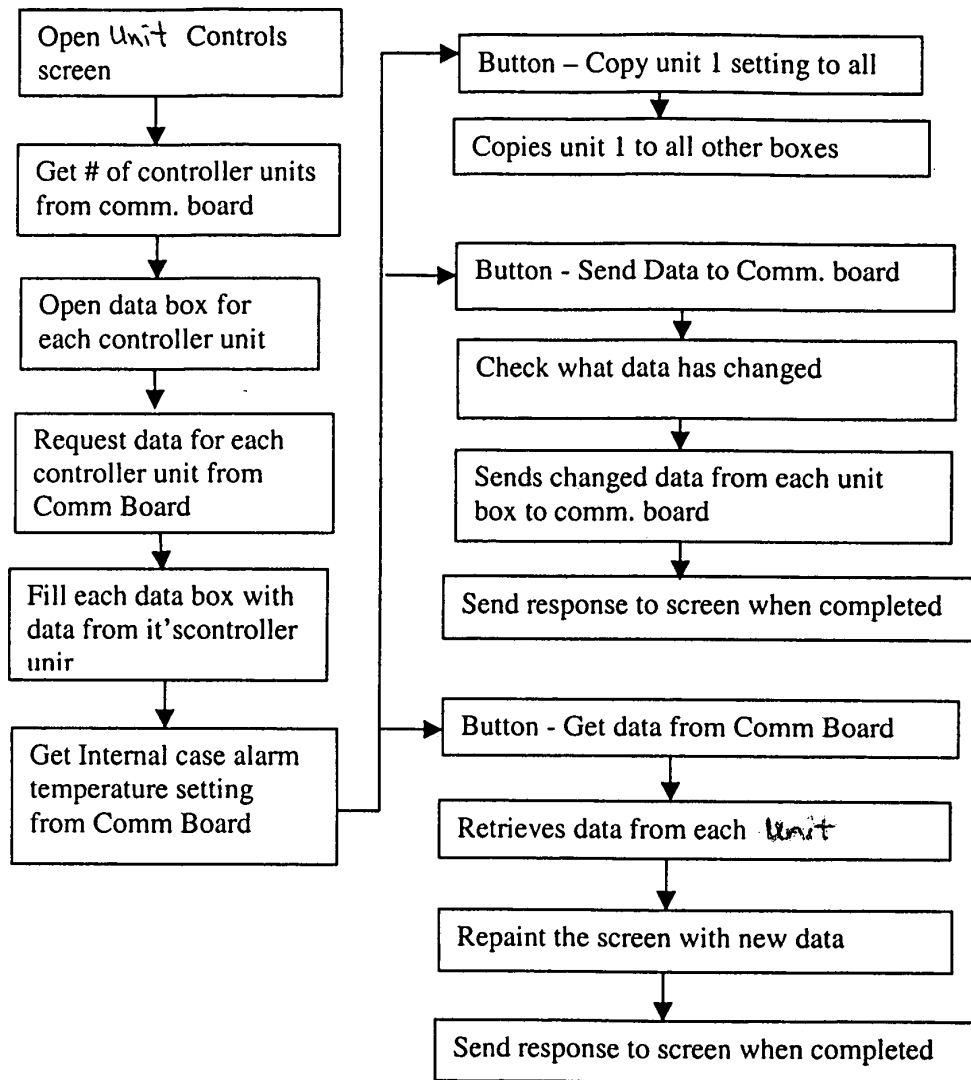


FIGURE 15g

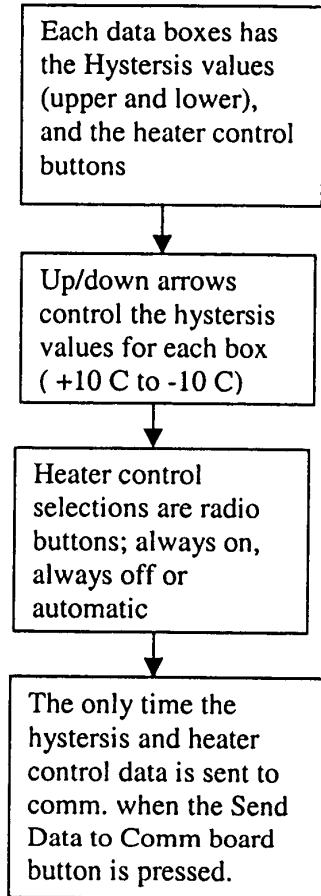


FIGURE 15h

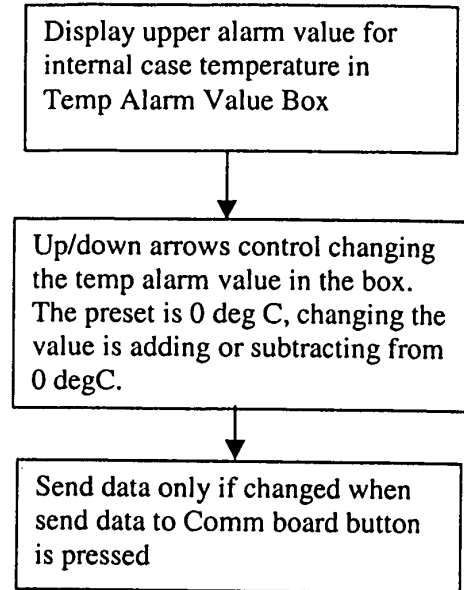
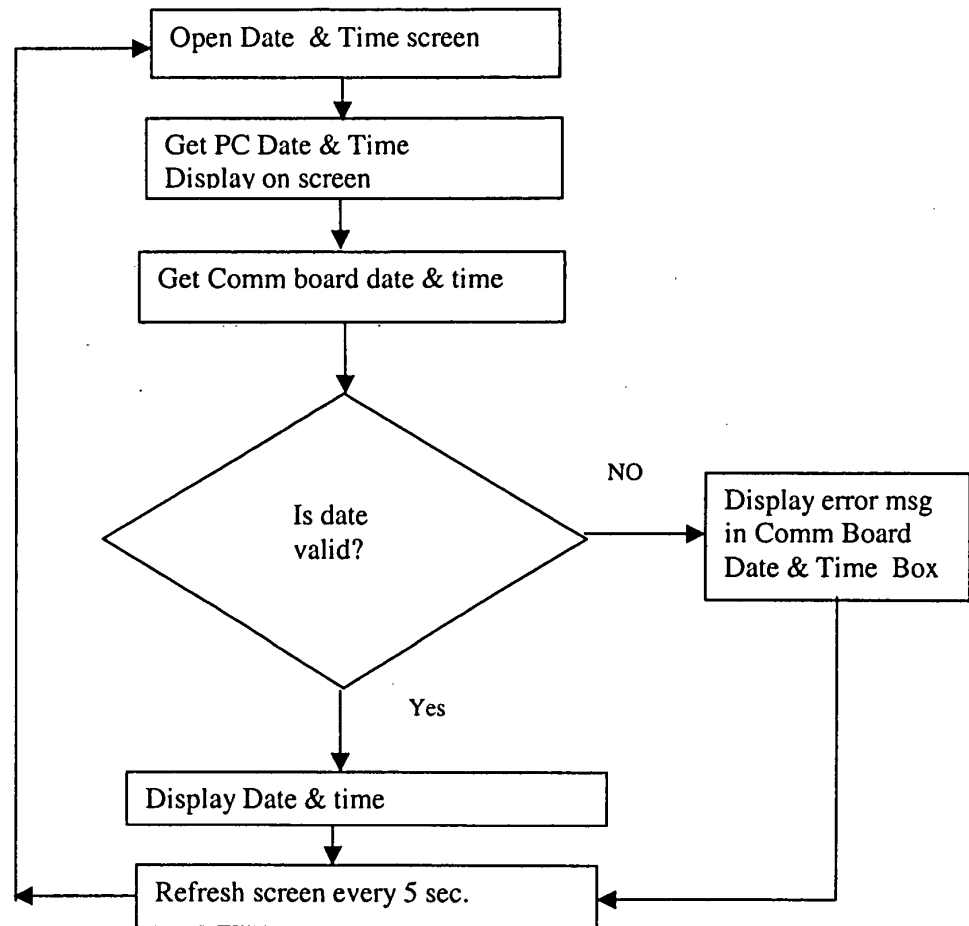


FIGURE 15i

FIGURE 15j



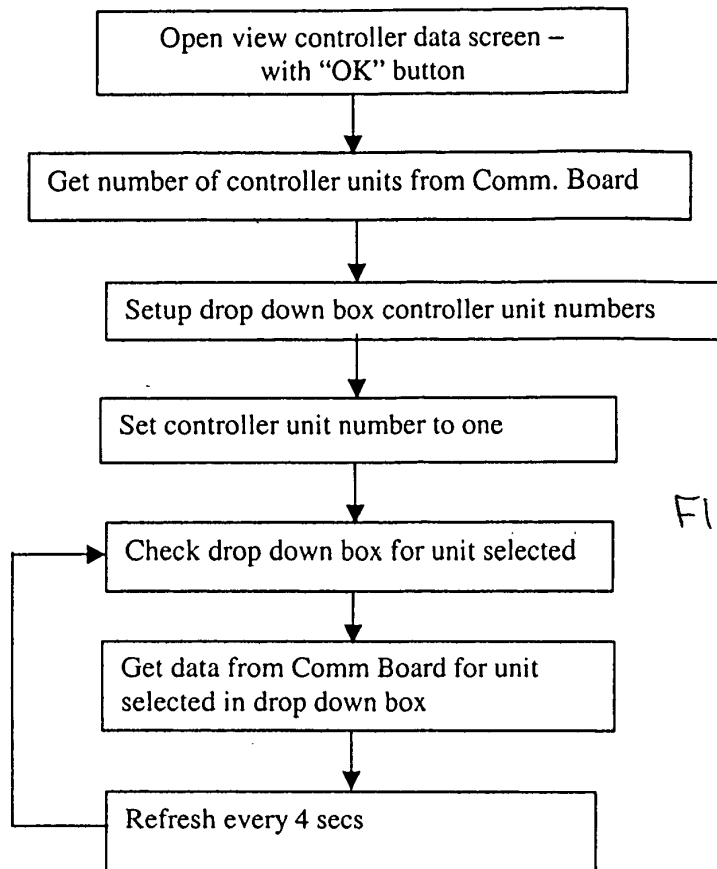


FIGURE 15k

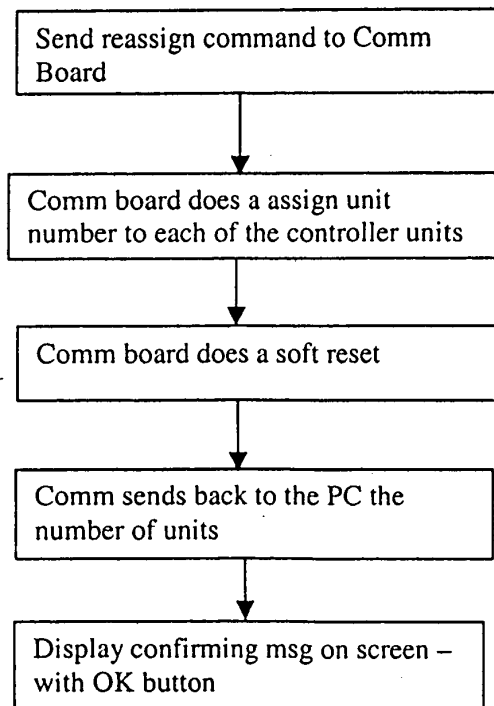


FIGURE 15l

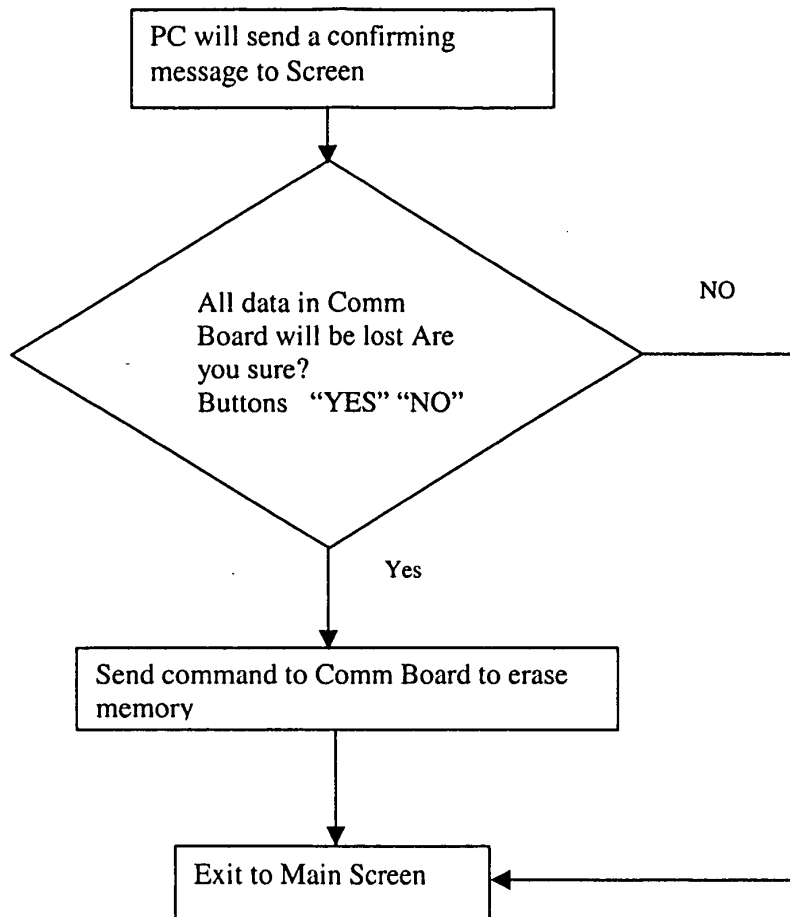


FIGURE 15_m

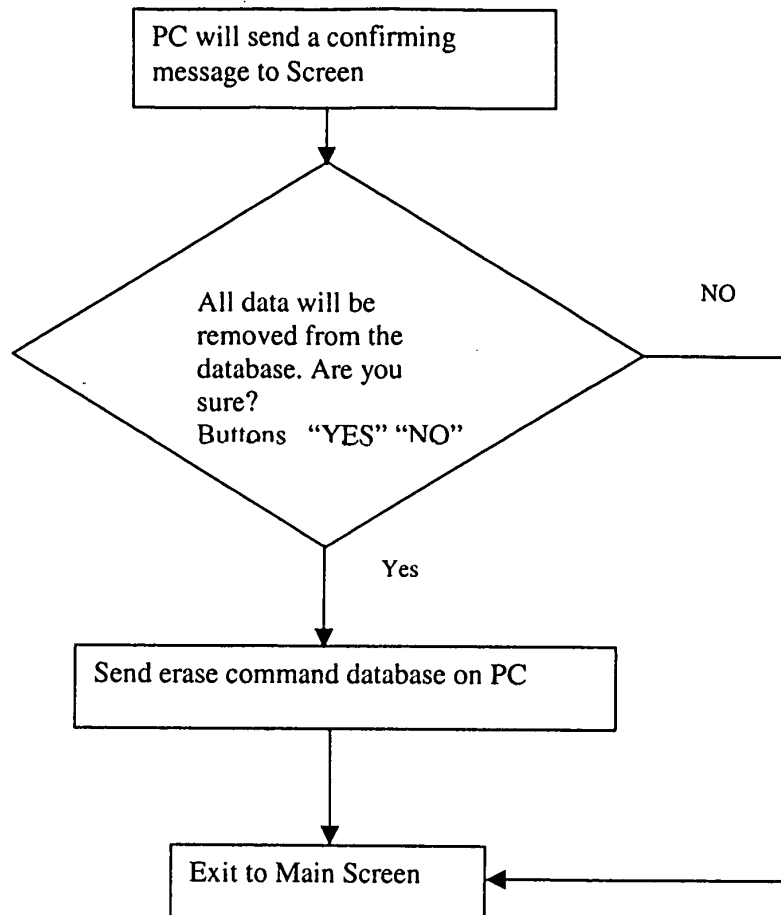


FIGURE 15n

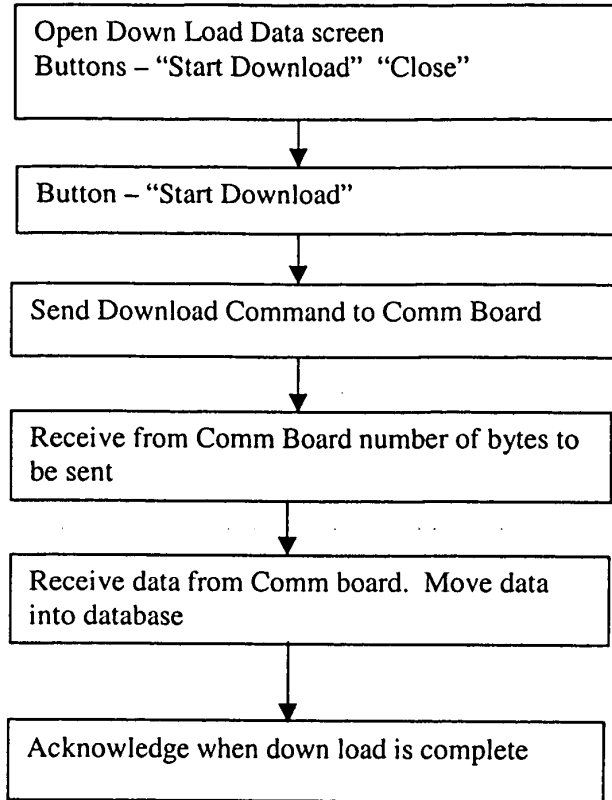


FIGURE 15o

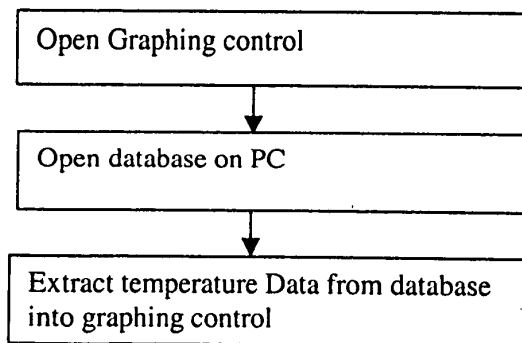


FIGURE 15p

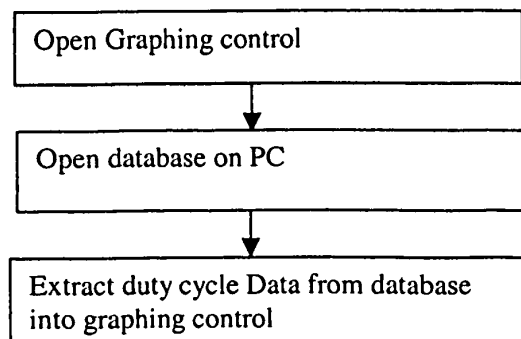


FIGURE 15g

DECLARATION FOR PATENT APPLICATION

As the below named inventors, we hereby declare that:

Our residences, post office addresses and citizenships are as stated below next to our names.

We believe we are the original, first and joint inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled REFRIGERATION UNIT CONDENSATION PREVENTION, specification of which

[illegible]

We hereby state that we have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

We acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, 1.56.

We hereby Claim foreign priority benefits under Title 35, United States Code 119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

			Priority Claimed	
			Yes	No
<u>N/A</u>				
<u>(Number)</u>	<u>(Country)</u>	<u>(Day/Month/Year Filed)</u>		

We hereby claim the benefit under Title 35, United States Code 119(e) of any United States provisional application(s) listed below.

<u>N/A</u>	
(Application Serial No)	(Filing Date)

We hereby claim the benefit under Title 35, United States Code 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior

United States application in the manner provided by the first paragraph of Title 35, United States Code 112, we acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

<u>N/A</u>		
(Application Serial No)	(Filing Date)	(status-patented, pending, abandoned)

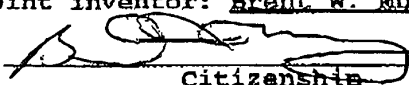
We hereby appoint the following attorneys and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Inventor's signature 
Date 3/1/05 Citizenship U.S.A.
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Post Office Address Same as Residence

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Inventor's signature Robert A. Maizner
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PATENT APPLICATION SERIAL NO. _____

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

03/04/2005 SHIHASS1 00000054 11069378

01 FC:2011	150.00 OP
02 FC:2111	250.00 OP
03 FC:2311	100.00 OP

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PTO-1556
(5/87)

*U.S. Government Printing Office: 2002 — 489-267/69033

PATENT APPLICATION FEE DETERMINATION RECORD

Effective December 8, 2004

11069378

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	20	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	20 minus 20 =	* 0
INDEPENDENT CLAIMS	3 minus 3 =	* 0
MULTIPLE DEPENDENT CLAIM PRESENT ☐		

* 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 ☐			

	(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 ☐			

	(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 ☐			

* 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	150.00
X\$ 25=	
X100=	
+180=	
TOTAL	150

RATE	FEE
BASIC FEE	300.00
X\$50=	
X200=	
+360=	
TOTAL	

SMALL ENTITY

OR OTHER THAN
SMALL ENTITY

RATE	ADDITIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL	

RATE	ADDITIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL	

RATE	ADDITIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL	

RATE	ADDITIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL	

RATE	ADDITIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL	

RATE	ADDITIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL	