

## Auto-Changeover Controller



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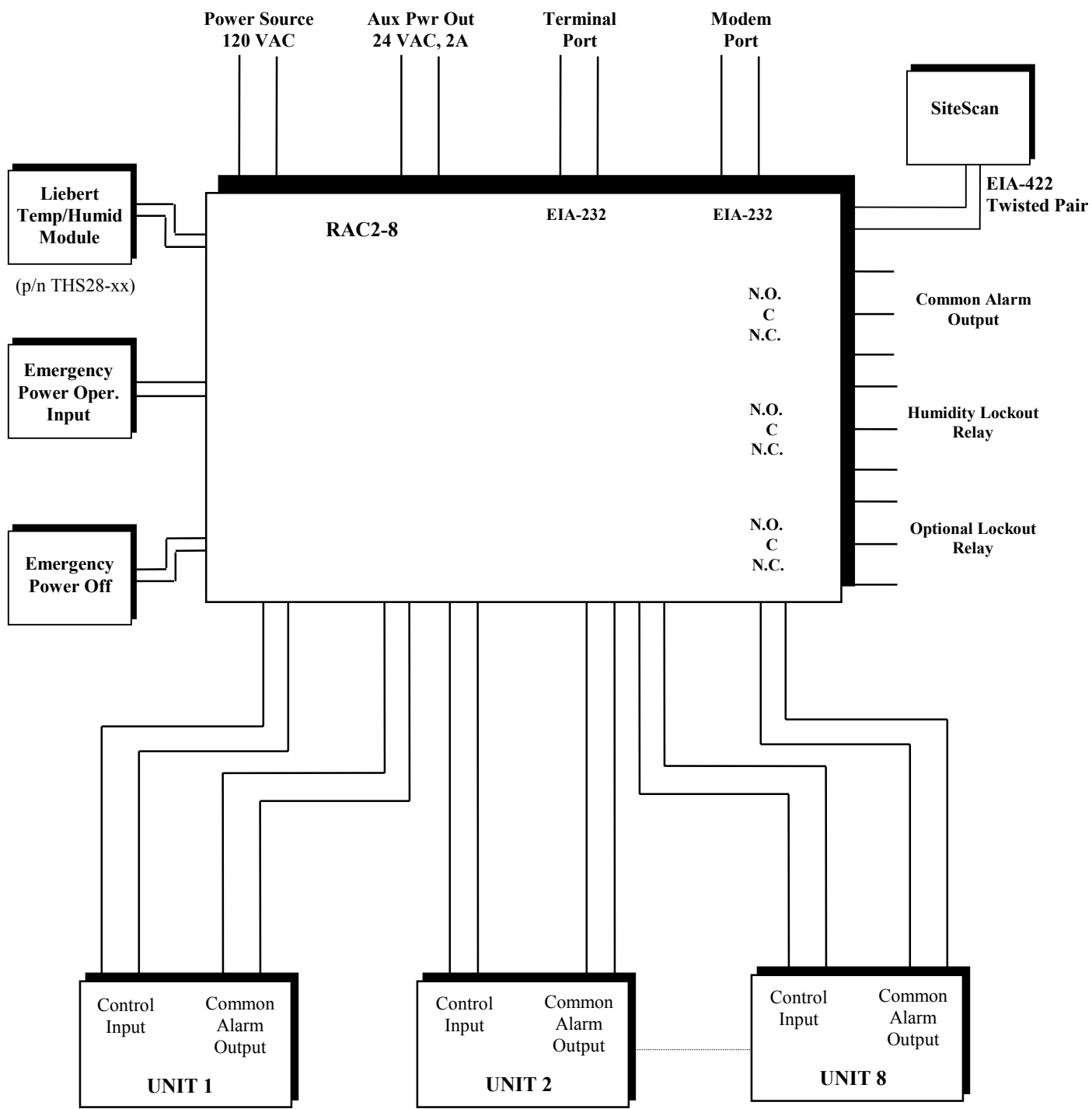


Figure i. Typical System Configuration



## Section 1: Introduction

See **SECTION 5** — **INSTALLATION** for special instructions when using the RAC2-8 with Liebert mini-MATE, mini-MATE Plus, and DataMate environmental control systems.

The Liebert RAC2-8 remotely controls from two to eight environmental units. Each unit is assigned to a Zone (room) from 1 to 4. In Zone 1, the largest room, the temperature and humidity can be monitored. The common alarm output from each unit is monitored and annunciated by the RAC2-8. Up to 20 system alarms can be stored with time and date stamp. All alarms are latching and must be manually cleared.

The most important control functions are Autochangeover, Autosequencing, and Standby Testing. Each unit can be assigned a Running or Standby status.

Autochangeover turns on a Standby unit if a Running unit in the same zone has an alarm. The Running unit (with alarm) will be turned off if that control option is selected. Each unit will return to its previous status when the alarm is manually cleared.

Autosequencing balances unit run-times by changing Standby units to Running (and Running units to Standby) at programmed time intervals.

Standby Testing turns on Standby units at programmed intervals to test their operation. Note that Autosequencing and Standby Testing cannot both be selected at the same time.

Other control functions include Manual Override, Emergency Power Operation, Power Failure Mode, Password, and Programmable Delays. Refer to **SECTION 4 — GLOSSARY OF CONTROL FUNCTIONS** for more details.

System outputs include Humidity Lockout Relay, Optional Control Lockout Relay, and Common Alarm. Communication ports are EIA-232 for terminal or printer, a modem port, and a proprietary EIA-422 port for communication to a Liebert SiteScan monitoring system.

The RAC2-8 can be operated locally from the built-in control panel or remotely from an optional terminal (EIA-232 communication). This manual shows examples of several typical display screens during both local and remote operation.



## Section 2: Start Up

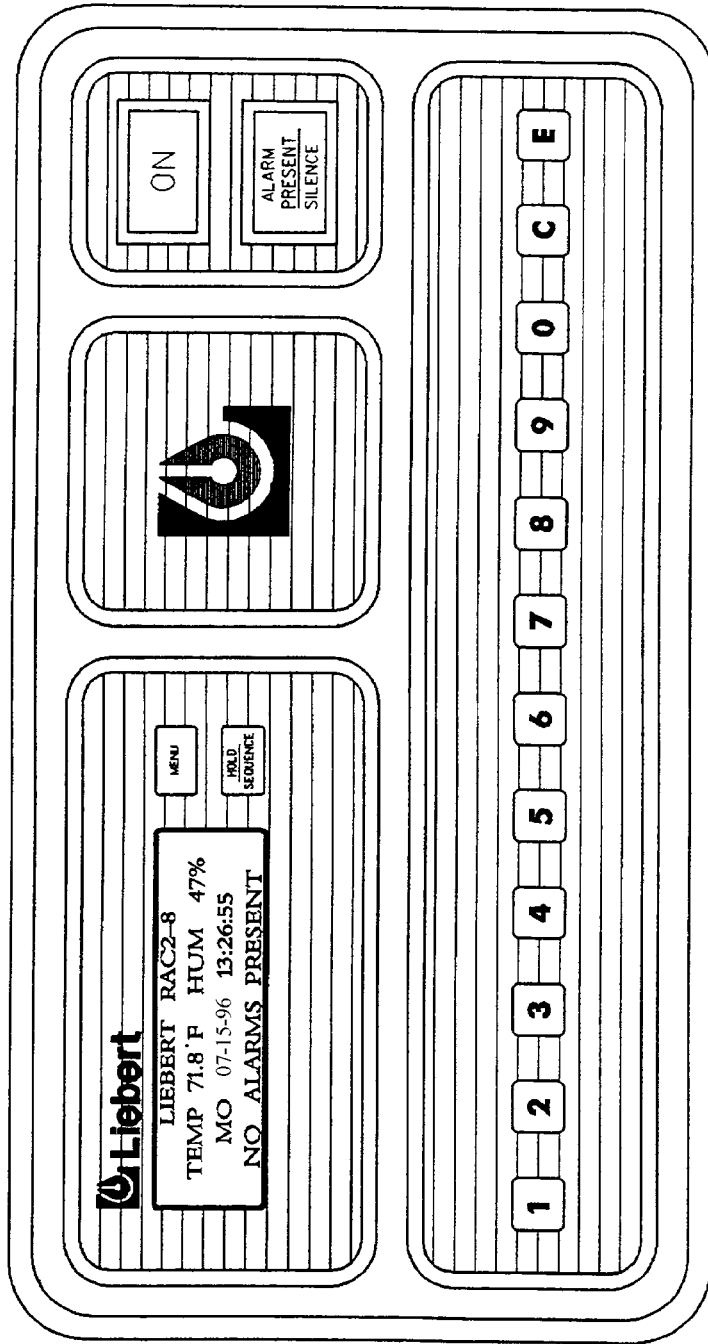
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### To start up the RAC2-8:

1. Mount unit to wall.
2. Connect cables.
3. Set switches and jumpers on circuit boards as required for your application. Refer to instructions and illustrations in **SECTION 5 — INSTALLATION**.
4. Make user programmable selections from the local control panel or from an optional remote terminal. Refer to **SECTION 4 — GLOSSARY OF CONTROL FUNCTIONS** and **SECTION 3 — OPERATION**.
5. Apply power to the unit. Note that the ON/OFF switch is inside the enclosure.

*Figure 2–1. Local Control Panel*





## Section 3: Operation

This chapter describes how to use the RAC2-8.

### Local

The following screens are displayed at the LCD display built into the RAC2-8 unit control panel. Refer to **SECTION 4 — GLOSSARY OF CONTROL FUNCTIONS** for more details.

### Sequencing Status Screens

With power ON, the following status screens are displayed in sequence.

```
LIEBERT RAC2-8
TEMP 71.8°F HUM 47%
MO 07-15-96 13:26:55
NO ALARMS PRESENT
```

```
STATUS ZONE 1
01-R 02-S

A=ALM S=STBY R=RUN
```

```
STATUS ZONE 2
03-R 04-S

A=ALM S=STBY R=RUN
```

```
STATUS ZONE 3
05-R 06-S

A=ALM S=STBY R=RUN
```

```
STATUS ZONE 4
07-R 08-S

A=ALM S=STBY R=RUN
```

## Sequencing Status Screens (cont'd.)

```
AUTO SEQUENCING ON
DAY 06 OF 15 <00:00>
TEMP STAGING OFF
```

Each screen is automatically displayed for 3 seconds.

To control the display of the status screens, you can press the Hold/Sequence button to hold a screen and to manually step through the screens. Press C to resume automatic sequencing. The system returns to the Sequencing Status Screens if no control keys have been pressed during a two minute period.

*xx is the number of alarms recorded since alarm history was last cleared. See Alarm submenu.*

If alarms are present, the last line of the first screen displayed above reads "ALARMS PRESENT - xx." Alarm screens are displayed next in the status sequence. Up to 20 alarms can be displayed, 5 screens of 4 alarms each. Alarms are stored in a First In First Out (FIFO) sequence.

*These functions cannot both be ON at the same time. Select the function required for your installation.*

Select either Auto Sequencing or Standby Testing from the Set Options Sub-menu.

## Password Screen

If the Password function is enabled, you must enter the valid password to access the RAC2-8 Main Menu. At the Enter Password screen, type the established password:

```
ENTER PASSWORD
>_____
```

Units are shipped from the factory with the Password function disabled. To enable the Password function, press the MENU button to display the Main Menu, then press 2 SETUP. Follow the instructions on page 12 to Set Password.

## Main Menu

Press the Menu button to display the Main Menu:

```
MAIN MENU
1.  STATUS          2.  SETUP
3.  ALARMS         4.  SET CLOCK
5.  OVERRIDE       6.  EXIT
```

Press 9 to display RAC2-8 revision code and date.

## Status Sub-menu

From the Main Menu, press 1. STATUS to display the Status Sub-menu:

```
STATUS MENU
1.  UNITS      2.  T/H
3.  A-DELAY   4.  R-DELAY
5.  H-DELAY   6.  RETURN
```

### 1. UNITS

From the Status Sub-menu, press 1. UNITS to display the Unit Status menu:

```
UNIT STATUS
01-R 02-S 03-R 04-S
05-R 06-S 07-R 08-S
A=ALM S=STBY R=RUN
```

### 2. T/H

From the Status Sub-menu, press 2. T/H to display the Temperature/Humidity screen:

```
TEMP 71.8°F HUM 47%
STAGING OFF
PUSH CLEAR TO RETURN
```

### 3. A-DELAY

From the Status Sub-menu, press 3. A-DELAY to display the Alarm Delays screen:

```
ALARM DELAYS
0000 0000 0000 0000
0000 0000 0000 0000
PUSH CLEAR TO RETURN
```

*Status Sub-menu (cont'd)*

The Alarm Delays screen indicates the time in seconds of an active delay on each unit. Active alarm delays count up while the condition is present and count down if the condition is cleared before the Alarm Delay time elapses.

**4. R-DELAY**

From the Status Sub-menu, press 4. R-DELAY to display the Restart Delays screen:

```

RESTART DELAYS
0000 0000 0000 0000
0000 0000 0000 0000
PUSH CLEAR TO RETURN

```

The Restart Delays screen indicates the time in seconds of an active restart delay on each unit.

**5. H-DELAY**

From the Status Sub-menu, press 5. H-DELAY to display the Hold Delay screen:

```

HOLD DELAY = 0000
PUSH CLEAR TO RETURN

```

Hold Delay applies to the system rather than to each unit. Therefore, only one number is displayed. This display indicates the time in seconds of an active Hold Delay.

*Set Options Sub-menu*

From the Main Menu, press 2. SETUP to display the Set Options Menu:

```

SET OPTIONS MENU
1.  UNITS          2.  DELAYS
3.  TEMP/HUM      4.  STANDBY
5.  PASSWORD      6.  RETURN

```

**1. UNITS**

From the Set Options Sub-menu, press 1. UNITS to display the Set Units menu:

*Set Options Sub-menu (cont'd)*

```

SET UNITS MENU
1.  ZONES/UNITS
2.  EMER.OP      3.  LABELS
4.  SHUTDOWN    5.  RETURN

```

### Section 3: Operation

---

*Note that the Clear button will not allow you to exit these screens until all selections have been made.*

From the Set Units menu, select 1. ZONES/UNITS to select the number of zones, number of units in each zone, and operating status of each unit. **Complete all of these selections before exiting this setup function.**

When you press 1. ZONES/UNITS, the RAC2-8 sequences through the screens you must complete.

```
SET NUMBER OF ZONES
RANGE 1-4 <4> >_
PUSH ENTER FOR NEXT
```

```
SET NUMBER OF UNITS
ZONE 1 <2> >_
PUSH ENTER FOR NEXT
```

Set Number of Units screen will be iterated for each zone selected (up to 4).

The RAC2-8 then displays the Set Status screen for Zone 1:

```
SET STATUS ZONE 1
01-R 02-S
1=RUN 0=STBY E=NEXT
```

Set Status screen is iterated for each zone selected. Press 1, or 0 to set the status. After you have selected the operating status of units in your last zone, Press E to return to the Set Units Menu.

From the Set Units menu, press 2. EMER OP. to display the Set Emergency Operating Units ON screen:

```
SET EMRG.OP UNITS ON
01-R 02-0 03-0 04-R
05-0 06-R 07-0 08-0
1=RUN 0=OFF E=NEXT
```

#### ***Set Options Sub-menu (cont'd)***

Beginning with unit 01, set each unit's emergency operating status. Press E to continue to the next unit. When you have configured the last unit, the RAC2-8 returns to the Set Units menu.

From the Set Units menu, press 3. LABELS to display the Assign Labels to Unit screen:

```
ASSIGN LABEL TO UNIT
1-01 2-02 3-03 4-04
5-05 6-06 7-07 8-08
PUSH ENTER FOR NEXT
```

Beginning with unit 01, assign a label to each unit. You can use two numbers, two letters, or a two-character number/letter label. Press E to continue to the next unit. When you have configured the last unit, the RAC2-8 returns to the Set Units menu.

From the Set Units menu, press 4. SHUTDOWN to display the Shutdown on Alarm screen:

```
SHUTDOWN ON ALARM
01-Y 02-Y 03-Y 04-Y
05-Y 06-Y 07-Y 08-Y
1=YES 0=NO E=NEXT
```

Beginning with unit 01, indicate 1 (Yes) or 0 (No) if the unit should shut down on alarm. When you have selected the shutdown status for the last unit, the RAC2-8 displays the Set Units menu.

When you have configured the delays, from the Set Units menu, press 5 to return to the Set Options Menu.

## 2. DELAYS

From the Set Options Sub-menu, press 2. DELAYS to display the Set Delays menu:

```
SET DELAYS MENU
1. ALARM          2.HOLD
3. UNIT RESTART
5. RETURN
```

From the Set Delays menu, press 1. ALARM to configure the Alarm Delay:

**SECTION 4 — GLOSSARY OF CONTROL FUNCTIONS**  
includes a functional description of each delay.

### Set Options Sub-menu (cont'd)

```
ENTER ALARM DELAY
<10.0> XX.X MINUTES
THEN PUSH ENTER
PUSH CLEAR TO RETURN
```

Enter the desired time for the alarm delay. The default is 10 minutes. Press E to accept the new delay, then press C to return to the Set Delays menu.

From the Set Delays menu, press 2. HOLD to configure the Hold Delay:

```
ENTER HOLD DELAY
<10.0> XX.X MINUTES
THEN PUSH ENTER
PUSH CLEAR TO RETURN
```

Enter the desired time for the hold delay. The default is 10 minutes. Press E to accept the new delay, then press C to return to the Set Delays menu.

From the Set Delays menu, press 3. UNIT RESTART to configure the restart delay:

```
ENTER RESTART DELAY
<00.1> XX.X MINUTES
THEN PUSH ENTER
PUSH CLEAR TO RETURN
```

Enter the desired time for the restart delay. The default is 0.1 minutes. Press Enter to accept the new delay, then press C to return to the Set Delays menu.

When you have configured the delays, from the Set Delays menu, press 5 to return to the Set Options Sub-menu.

### 3. TEMP/HUM

From the Set Options Sub-menu, press 3. TEMP/HUM to display the Set T/H menu:

```
SET T/H MENU
1.T/H ALARM POINTS
2.TEMP. STAGING
3.F/C          4.LOCK          5.EXIT
```

#### *Set Options Sub-menu (cont'd)*

The Set Temp/Hum and Temp Staging functions apply only to Zone 1. The temperature and humidity inputs are from a separate remote sensor, not from an operating unit.

From the Set T/H menu, press 1. T/H ALARM POINTS:

```
TEMP HI>75 LOW>65
HUM HI>60 LOW>40
<RANGE 50-90> 00=off
E=NEXT C=RETURN
```

Beginning with Temp Hi, enter the temperature and humidity alarm points. The third line displays the range for the alarm limit you are selecting. Press E to continue to the next point. When you have set all points, press C to return to the Set T/H menu.

From the T/H menu, press 2. TEMP. STAGING:

```
STAGING ON/OFF   >OFF
NORMAL TEMP      >72
SENSITIVITY      >02
1=ON   0=OFF     E=NEXT
```

Beginning with Staging ON/OFF, configure each parameter. Press E at the last parameter to return to the T/H menu.

From the T/H menu, press 3. F/C to configure degrees in Fahrenheit or Celsius:

```
SELECT F/C <F>
```



```

1. F
2. C
5. RETURN

```

From the T/H menu, press 4. LOCK to configure the optional Humidity Lockout feature:

```

HUMIDITY LOCKOUT
SET HI>00 LOW>00
(RANGE 20-80) 00=OFF
E=NEXT C=RETURN

```

Refer to **SECTION 4 — GLOSSARY OF CONTROL FUNCTIONS** for details on the Humidity Lockout feature.

### *Set Options Sub-menu (cont'd)*

#### **4. STANDBY**

From the Set Options Sub-menu, press 4. STANDBY to display the Standby Options menu:

```

STANDBY OPTIONS MENU
1. AUTO SEQUENCE UNIT
2. AUTO STANDBY TEST
5. RETURN

```

From the Standby Options menu, select Auto Sequencing, Standby Testing, or neither. These functions cannot both be active (ON) at the same time.

Select the desired function. If you select 1. AUTO SEQUENCE UNIT, you must also configure a schedule for your installation:

```

AUTO SEQUENCING ON
EVERY <0-99> XX DAYS
AT TIME 00:00
00=OFF E=NEXT C=RTN

```

#### **5. PASSWORD**

From the Set Options Sub-menu, press 5. PASSWORD to display the Set Password menu:

```

SET PASSWORD MENU
1. NEW PASSWORD
5. RETURN

```

The Password function provides security to the RAC2-8 so that only authorized personnel can make Setup changes to the system.

Press 1. NEW PASSWORD to set a new four-digit password for the system, then follow the instruction on the screens:

```
ENTER NEW PASSWORD
>
THEN PUSH ENTER
PUSH CLEAR TO RETURN
```

Enter "0000" to disable the Password function.

### *Set Options Sub-menu (cont'd)*

```
CONFIRM NEW PASSWORD
>
THEN PUSH ENTER
```

When you have finished configuring the Password, Press E to return to the Main Menu.

### *Alarm Sub-menu*

From the Main Menu, press 3. ALARMS to display the Alarm Sub-menu:

```
ALARM MENU
1. ALARM REVIEW
2. CLEAR ALARMS
3. RETURN
```

Press 1 to review all alarms. The RAC2-8 can store up to 20 alarms in the alarm memory buffer in a First-In-First-Out (FIFO) sequence.

For each alarm, the review screen displays the alarm number, total number of alarms, date and time stamp, and the alarm message:

```
ALARM #01/05 ZONE #1
@ 07-15-96 15:20:42
UNIT XX COMMON ALARM
PUSH ENTER FOR NEXT
```

If there are no alarms, the screen reads "NO ALARMS PRESENT."

```
NO ALARMS PRESENT

PUSH CLEAR TO RETURN
```

Press 2. to display the CLEAR ALARMS screen, then press 1 again to clear all alarms:

```
CLEAR ALARMS
1. CLEAR ALL ALARMS
2. RETURN
```

**Set Clock Sub-menu**

From the Main Menu, press 4. SET CLOCK to display the Set Clock Sub-menu:

```
SET CLOCK MENU
1. DATE    2. TIME
3. DAY OF WEEK
4. RETURN
```

**1. DATE**

Press 1 to set the system date:

```
MO 07-15-96 15:12:34
SET DATE MM-DD-YY
THEN PUSH ENTER
PUSH CLEAR TO RETURN
```

The first line displays the current system day, date, and time. Enter the new date, then press E to return to the Set Clock Sub-menu.

**2. TIME**

Press 2 to set the system time:

```
MO 07-15-96 15:12:34
SET TIME HH:MM:SS
THEN PUSH ENTER
PUSH CLEAR TO RETURN
```

The first line displays the current system day, date, and time. Enter the new time, then press E to return to the Set Clock Sub-menu.

**3. DAY OF WEEK**

Press 3 to set the system day of the week:

```
SET DAY >MON
1-SUN 2-MON 3-TUE
4-WED 5-THU 6-FRI
7-SAT 8-RETURN
```

Enter the appropriate number for the desired day. When finished, press 8 to return to the Main Menu.

**Override Submenu**

From the Main Menu, press 5. OVERRIDE to display the Override a Unit screen:

```
OVERRIDE A UNIT
ENTER UNIT #
THEN PUSH ENTER
PUSH CLEAR TO RETURN
```

The Override function lets you manually force a unit ON or OFF, or to restore a forced unit to the normal control of the RAC2-8 system. The Override function acts immediately, ignoring the Hold Delay. An override message with time stamp is entered in the Alarm memory buffer. The Alarm light remains on while any unit is in an Override mode.

To override a unit, enter the two digit label assigned to the unit, then press Enter:

```
UNIT 01 FORCED ON
2. FORCE OFF
3. RESTORE
4. RETURN
```

Select the desired override option.

When finished, press 4 to return to the Main Menu.

---

## Terminal

A local terminal can be connected directly by an EIA-232 communication cable to the RAC2-8, or a remote terminal can be connected through modems. All of the status information and control functions available at the RAC2-8 local display are available from the terminal. An additional function available at the terminal is Set Modem.

The terminal also displays a status message with time and date stamp whenever a unit changes status (OFF or ON). These status messages will be printed if a printer (instead of a terminal) is connected to the EIA-232 port. Once each 24 hours (at midnight) the terminal checks its ability to communicate with the RAC2-8 and writes a Comm Check message.

A terminal connected to an active RAC2-8 displays alarm and status messages when they occur. The prompt then asks the operator to press <space>, <S>, or <A>.

```
07-15-96    12:14:12    On UNIT 03 FORCED ON
07-15-96    12:14:19    On UNIT 63 RESTORED Menu
Exited - Press <space> to Enter Menu, <S> for
Status, <A> for Alarms
```

<space> displays Main Menu after a password is entered.

<S> displays present status.

<A> displays a list of alarms (up to 20).

### LOG ON:

is the prompt to enter a password. This prompt is also displayed when the system is accessed through a modem.

## Main Menu

The Main Menu is displayed on a terminal as shown below:

```
RAC2-8 MAIN MENU
1. Status
2. Setup Zones/Units Options Menu
3. Alarms Review
4. Alarms Clear
5. Set Clock
6. Override a Unit
7. Set Modem Options
8. Setup Temp/Humid Options Menu
9. Setup Standby Unit Options
A. Display SS Alarm Block
P. Set New Password
X. Exit
```

### Main Menu (cont'd)

*When you make a program selection from the terminal, the screen is displayed again with the new value(s).*

Each Main Menu item has a corresponding screen that lets you configure the system parameters. Each screen is shown in the following sections.

Status Screen

The Status screen is displayed by pressing the <S> key (no password required) or by pressing the <1> key from the Main Menu.

```
RAC2-8 STATUS - 07-16-96 09:22:13
Temperature = 70.6°F      Humidity = --%      Modem = OFF

UNIT   LABEL   ZONE   EMRG.PWR SHUTDOWN   STATUS
-----
01     01     1      R Y     RUNNING
02     02     1      R N     RUNNING
03     03     1      R N     RUNNING
04     04     1      R N     STANDBY
05     05     0      O N     UNPROGRAMMED
06     06     0      R N     UNPROGRAMMED
07     07     0      R N     UNPROGRAMMED
08     08     0      R N     UNPROGRAMMED

Alarm Delay           = 10.0
Hold Delay            = 10.0
Auto Restart Delay    = 00.1

High Temperature Alarm = 00   Low Temperature Alarm = 00
High Humidity Alarm    = 00   Low Humidity Alarm    = 00
High Humidity Lockout  = 00   Low Humidity Lockout  = 00

AUTO SEQUENCING       = ON
STANDBY TESTING       = OFF
DAY 01 of 59 @ 00:00
Temperature Staging   = OFF

NO ALARMS PRESENT

Press menu selection (1-X) key <ESC to display Main Menu>
```

Configure the parameters as desired.

*Setup Zones/Units Options*

Press 2 from the Main Menu to display the Set Options menu. The following screens show the terminal display that enables you to configure the Options menu items.

**NUMBER OF ZONES/NUMBER OF UNITS PER ZONE**

```

RAC2-8 MAIN MENU

SET OPTIONS MENU
1. Set Number of Zones
2. Set Number of Units per Zone
3. Set Unit Status
4. Set Emergency Power Units
5. Set Unit Shutdown on Alarm
6. Set Unit Labels
7. Set Alarm Delay
8. Set Hold Delay
9. Set Restart Delay
<ESC> TO EXIT

CURRENT NUMBER OF ZONES = 1
ENTER NEW NUMBER (1-4) <ESC to quit> >2

CURRENT NUMBER OF ZONES = 2
ENTER NEW NUMBER (1-4) <ESC to quit> >

SET OPTIONS MENU

** SET NUMBER OF UNITS PER ZONE **
ZONE 1 = 4 UNITS
ZONE 2 = 0 UNITS
ZONE 3 = UNPROGRAMMED
ZONE 4 = UNPROGRAMMED
ENTER ZONE (1 - 2) <ESC to quit> >2
ZONE 2 has 0 UNITS
ENTER NEW NUMBER (2-8) <ESC to quit> >2

** SET NUMBER OF UNITS PER ZONE **
ZONE 1 = 4 UNITS
ZONE 2 = 2 UNITS
ZONE 3 = UNPROGRAMMED
ZONE 4 = UNPROGRAMMED
ENTER ZONE (1 - 2) <ESC to quit> >

SET OPTIONS MENU

```

*Setup Zones/Units Options (cont'd)*

Configure the number of zones and number of units as desired.

**UNIT STATUS**

```

SET OPTIONS MENU

** SET UNIT STATUS **
UNIT      LABEL  ZONE      STATUS
-----
1         01     1         RUNNING

```

```

2      02      1      RUNNING
3      03      1      RUNNING
4      04      1      STANDBY
5      05      2      RUNNING
6      06      2      STANDBY
7      07      0      UNPROGRAMMED
8      08      0      UNPROGRAMMED
PRESS UNIT (1-8) KEY <ESC TO QUIT> 3
PRESS A KEY (R=RUN or S=STANDBY) <ESC to quit> >07-17-96
00:24:29 UNIT 03 SHUTDOWN

** SET UNIT STATUS **
UNIT      LABEL  ZONE      STATUS
-----
1         01      1         RUNNING
2         02      1         RUNNING
3         03      1         STANDBY
4         04      1         STANDBY
5         05      2         RUNNING
6         06      2         STANDBY
7         07      0         UNPROGRAMMED
8         08      0         UNPROGRAMMED
PRESS UNIT (1-8) KEY <ESC TO QUIT>

```

**Setup Zones/Units Options (cont'd)**

*The number of Running units can be reduced to limit the load on the backup power source (a UPS system or a standby generator).*

**EMERGENCY POWER UNITS**

```

SET OPTIONS MENU

** SET EMERGENCY POWER UNITS **
UNIT      LABEL  ZONE  EMERGENCY POWER
-----
1         01      1      RUN
2         02      1      RUN
3         03      1      RUN
4         04      1      RUN
5         05      2      OFF
6         06      2      RUN
7         07      0      RUN
8         08      0      RUN
PRESS UNIT (1-8) KEY <ESC TO QUIT> 1

```

**Unit Shutdown on Alarm**

When an alarm occurs in a Running unit, the Standby unit in the same zone will be turned ON. The unit in alarm will remain ON unless it is programmed to be turned OFF (Yes).

```

SET OPTIONS MENU

** SET UNIT SHUTDOWN ON ALARM **
UNIT  LABEL  ZONE  SHUTDOWN
-----
1     01     1     YES
2     02     1     NO
3     03     1     NO
4     04     1     NO
5     05     2     NO
6     06     2     NO
7     07     0     NO

```



PRESS <sup>8</sup>UNIT (<sup>08</sup>1-8) KEY <sup>0</sup><ESC<sup>NO</sup> TO QUIT> 1

### Unit Labels

The RAC2-8 will accept any 2 digit label if you prefer something other than 01 through 08.

```
SET OPTIONS MENU

** SET UNIT LABEL **
   UNIT  LABEL
-----
      1    01
      2    02
      3    03
      4    04
      5    05
      6    06
      7    07
      8    08
PRESS UNIT (1-8) KEY <ESC TO QUIT> 1
```

### Alarms Review and Alarms Clear

Press 3 or 4 from the Main Menu to access the Alarms Review and Alarms Clear screens. The RAC2-8 can store and display up to 20 Alarms with time and date stamp. All alarms are latching and must be cleared manually.

```
RAC2-8 MAIN MENU

NO ALARMS PRESENT
07-18-96 00:25:47 ALARMS CLEARED
```

### Set Clock

Press 5 from the Main Menu to display the Set Clock screen.

```
RAC2-8 MAIN MENU

Current Date/Time is THU 07-18-96 00:25:50
Enter New Date/Time (DOW MM-DD-YY HH:MM) MON 07-22-96 09:15
Current Date/Time is MON 07-22-96 09:15:00
```

Set the new date and time as desired.

*Override A Unit*

Press 6 from the Main Menu to display the Override a Unit screen. A unit can be Forced ON, Forced OFF, or Restored to automatic control.

```

RAC2-8 MAIN MENU

** OVERRIDE A UNIT **
  UNIT LABEL STATUS
-----
    1   01   RUNNING
    2   02   RUNNING
    3   03   STANDBY
    4   04   STANDBY
    5   05   RUNNING
    6   06   STANDBY
    7   07   UNPROGRAMMED
    8   08   UNPROGRAMMED
PRESS UNIT (1-8) KEY <ESC TO QUIT> 3
1. FORCE ON
2. FORCE OFF
3. RESTORE
07-22-96 12:14:12 On UNIT 03 FORCED ON

** OVERRIDE A UNIT **
  UNIT LABEL STATUS
-----
    1   01   RUNNING
    2   02   RUNNING
    3   03   FORCED ON
    4   04   STANDBY
    5   05   RUNNING
    6   06   STANDBY
    7   07   UNPROGRAMMED
    8   08   UNPROGRAMMED
PRESS UNIT (1-8) KEY <ESC TO QUIT> 3
1. FORCE ON
2. FORCE OFF
3. RESTORE
07-22-96 12:14:19 On UNIT 03 RESTORED

```

*Set Modem Options*

Press 7 from the Main Menu to display the Set Modem Options screen.

```
RAC2-8 MAIN MENU

** SET MODEM OPTIONS **
1. Phone Number      =
2. Site ID           =
3. Dial Prefix       = ATE1X4DT
4. Redial Interval (minutes) = 01
5. Redial Tries (--- = Forever)      = 03
6. Modem Messages Y/N   = No
<ESC> TO EXIT
Phone Number = 7944

** SET MODEM OPTIONS **
1. Phone Number      = 7944
2. Site ID           =
3. Dial Prefix       = ATE1X4DT
4. Redial Interval (minutes) = 01
5. Redial Tries (--- = Forever)      = 03
6. Modem Messages Y/N   = No
<ESC> TO EXIT
Site ID           = AIR ROOM #1
```

These parameters are unique to terminal operation.

The Site ID (up to 20 characters) is user selected to identify a specific facility. The Dial Prefix activates the modem and therefore must be compatible with the modem. The Dial Prefix is factory set. **Do not change the Dial Prefix without consulting the modem user's manual.** Modem messages describe modem activity such as No Answer, Line Busy, Redial in 3 Minutes, etc. Select Yes if you want these messages displayed at the terminal.

Make modem baud rate selection by setting DIP Switch 2-1 inside the RAC2-8 enclosure. Refer to Figure 5-4 in **SECTION 5 — INSTALLATION**. Set Switch 2-2 to ON (down) if you are using a leased line.

The Modem must be Hayes or Hayes compatible. Switches inside the modem should remain factory set except the following which are user selectable.

**Set Modem Options (cont'd)**

Hang up on DTR on-off transition  
 Model 1200: SW1 up and SW10 down  
 Model 2400: &D3

Track status of carrier detect  
 Model 1200: SW6 up  
 Model 2400: &C1

Enable Auto-answer  
 Model 1200: SW5 up  
 Model 2400: S0=1

**Setup Temp/Humid Options**

Press 8 from the Main Menu to display the Setup Temp/Humid Options screen.

```

RAC2-8 MAIN MENU

** SET TEMP/HUMIDITY OPTIONS **
1. High Temperature Alarm = 00
2. Low Temperature Alarm = 00
3. High Humidity Alarm = 00
4. Low Humidity Alarm = 00
5. Temperature Staging = OFF
6. Normal Temperature = 70
7. Sensitivity = 02
8. Temp Display (F/C) = F
9. High Humidity Lockout = 60
A. Low Humidity Lockout = 00
<ESC> TO EXIT
High Temperature Alarm = (50-90) >80

** SET TEMP/HUMIDITY OPTIONS **
1. High Temperature Alarm = 80
2. Low Temperature Alarm = 00
3. High Humidity Alarm = 00
4. Low Humidity Alarm = 00
5. Temperature Staging = OFF
6. Normal Temperature = 70
7. Sensitivity = 02
8. Temp Display (F/C) = F
9. High Humidity Lockout = 60
A. Low Humidity Lockout = 00
<ESC> TO EXIT

Temperature Staging = (ENTER 1 for ON, 0 for OFF) >ON

```

**Setup Temp/Humid Options (cont'd)**

Temperature and humidity options apply to Zone 1. The system inputs come from a remote temp/hum sensor. Each alarm can be disabled by entering 00 as the alarm trip-point. Temperature Staging turns on a Standby unit when the room temperature exceeds the Normal Temperature by the number of degrees entered in Sensitivity. Also note that temperature can be displayed in either degrees F or degrees C.

### *Setup Standby Unit Options*

Press 9 from the Main Menu to display the Set Standby Unit Options screen:

```
RAC2-8 MAIN MENU

** SET STANDBY UNIT OPTIONS **
1. Auto Sequencing    = ON
2. Standby Testing    = OFF
3. Day Interval       = 89
4. At Time            = 07:00
<ESC> TO EXIT
Auto Sequencing = (ENTER 1 for ON, 0 for OFF) >OFF

** SET STANDBY UNIT OPTIONS **
1. Auto Sequencing    = OFF
2. Standby Testing    = OFF
3. Day Interval       = 89
4. At Time            = 07:00
<ESC> TO EXIT
```

Two options are available for controlling Standby units (in addition to Autochangeover). The RAC2-8 will operate with both of these options turned OFF, or with **one** of them turned ON. Select the option (or neither) required for your installation. The interval (in days) and time of day are user selected.

Auto Sequencing balances the run time of units by changing the status of a Standby unit to Running, and changing the Running unit to Standby.

Standby Testing tests the operating condition of a Standby unit by turning it ON for a period of time equal to the Hold Delay plus the Alarm Delay. The Running unit is turned OFF during this period if it is programmed to shutdown on an alarm.

*Display SS Alarm Block*

This display is useful to a Liebert Customer Engineer for system diagnostics.

*Set New Password*

Press P from the Main Menu to configure a password for terminal operation.

```
Enter New Password (4 chars) <ESC to quit> >****  
Confirm New Password (4 chars) <ESC to quit> >****  
OK
```

This Password can be different from the one used locally at the RAC2-8.

Enter "TERM" to disable the Password function from the terminal. A Password is always be required when accessing the RAC2-8 system through a modem.

## Section 4: Glossary of Control Functions

The following terms are used to describe the control and operation of the Liebert RAC2-8. For each term, both the operator actions and the system performance are defined. Refer to this section if necessary while setting up your system or to answer any questions about how the system operates.

### *Alarms*

For each alarm condition or warning condition, the RAC2-8 locally annunciates the condition, locally displays the message, provides a time and date stamp, stores up to 20 messages in memory, and displays the message at a remote terminal. Alarms are produced for normal alarm conditions such as Common Alarm inputs and Temp/Hum alarms. Warnings are produced for conditions such as Manual Override.

#### **List of Alarms**

|                      |                               |
|----------------------|-------------------------------|
| UNIT XX COMMON ALARM | Alarm                         |
| EMERGENCY POWER OFF  | Alarm                         |
| EMERGENCY POWER OP.  | Alarm                         |
| MANUAL OVERRIDE      | Alarm                         |
| HIGH TEMP ALARM      | Alarm                         |
| LOW TEMP ALARM       | Alarm                         |
| HIGH HUM ALARM       | Alarm                         |
| LOW HUM ALARM        | Alarm                         |
| STBY NOT AVAILABLE   | Alarm                         |
| STBY UNIT FAILED     | Alarm                         |
| UNIT XX FORCED ON    | Warning<br>(no audible alarm) |
| UNIT XX FORCED OFF   | Warning<br>(no audible alarm) |
| UNIT XX RESTORED     | Warning<br>(no audible alarm) |



### *Alarm Annunciation*

The RAC2-8 provides the following alarm annunciation mechanisms:

- Audible indication (horn).
- A lighted 'Alarms Present' front panel indicator.
- Activation of the Common Alarm relay output.
- Display of alarm messages on the front panel LCD.

Warnings activate the 'Alarms Present' indicator and a message on the LCD, but no audible alarm or Common Alarm.

When an alarm occurs the LCD immediately displays a message (unless an Override screen is being displayed). Pushing the Alarms Present/Silence pushbutton acknowledges the alarm and silences the alarm horn. The alarm message is displayed until the alarm is acknowledged (silenced). After the alarm is silenced, normal status display scanning resumes.

Any alarms present are displayed during scanning of normal display pages. If more than 4 alarms are present additional pages of alarms are created as necessary. Up to 20 alarms are stored in a First-In-First-Out sequence.

### *Alarm Communications*

EIA-232 Terminal Port—Transmits Alarm with time stamp.

EIA-232 Modem Port—Dials out alarm.

Both EIA-232 ports are compatible with SS-AMS (SiteScan Alarm Management System).

EIA-422 (proprietary) to SiteScan monitoring system.

### *Alarm Delay*

Delay before an alarm is annunciated (false alarm delay). This delay begins on the occurrence of an alarm condition in a unit. If the alarm condition has not corrected itself by the end of the delay period, the alarm is annunciated and an autochangeover to the standby unit Occurs. If a unit is programmed to shutdown on an alarm, the unit shuts down when the alarm is annunciated. The Alarm Delay timer counts both up **and** down and an active Alarm Delay timer can be monitored at the display. The Alarm Delay is user selectable from the display. Range - 0.1 to 60 minutes, in increments of 0.1 minute (6 sec).

### *Autochangeover*

If an alarm occurs in a Running unit, a Standby unit in the same zone is started. The Running unit in alarm is stopped if it is programmed to shut down, and the Standby unit is started. The Standby unit changes status to become the Running unit and remains running until the Alarm is manually cleared. Messages are written to the terminal to record the status changes. Status screens show new unit status at the local display. After a changeover, the newly started unit may briefly have a High Temp or other alarm. A user selectable Hold Delay begins when any

unit is turned ON. During the Hold Delay no alarms are annunciated from the started unit or any unit in the system.

If the Standby unit has an alarm, the Running unit is restarted if DIP switch 1-8 is ON. Also, whenever the alarm is cleared in a Running unit, the unit is turned on and the Standby unit is turned off.

### *Autosequencing*

An optional operating mode in which Standby units are periodically sequenced to RUN to balance operating time among all units. Select Autosequencing ON or OFF from the display. Note that Autosequencing and Standby Testing cannot both be ON at the same time.

When Autosequencing is ON, periodically the Standby and Running units are changed to balance unit running time. This interval (in days) and time of day are user selected from the display. When this changeover Occurs, the Standby unit becomes a running unit, and the Running unit that has been running the longest becomes the Standby Unit. Messages are written to the terminal to record the status changes. Status screens show new unit status at the local display.

After a changeover, the newly started unit may briefly have a High Temp or other alarm. A user selectable Hold Delay begins when any unit is turned ON. During the Hold Delay no alarms are annunciated from the started unit or any unit in the system. If the newly started unit has an alarm at the end of this delay (plus the Alarm Delay), this unit is shut down, and the previously running unit is restarted. An alarm is indicated on the LCD and the alarm is annunciated.

If a zone includes more than 1 Standby unit, the same actions occur. At the end of each Interval, one unit is started and one is stopped. For example, if two Standby units are used, the First is started after the First Interval. The unit that had been running the longest becomes the Standby unit. After the second Interval, the second Standby unit is started, and the Running unit with the longest operating time becomes the Standby unit.

### *C key*

The Clear key <C> at the local control panel serves two functions:

- Remove incorrectly entered data.
- Return to the previous display page.

### *Clear Alarms*

All alarms are latching and must be manually cleared from the control panel or from a terminal. Be sure to review alarms before clearing them because recent alarm history is your best indication of system performance. When alarms are cleared, units that are running because of an Autochangeover will change back to their programmed status.

### *Common Alarm—Inputs*

Each environmental control unit has a Common Alarm contact closure output. The RAC2-8 receives the Common Alarm from each unit as a control input. These alarms are annunciated only if the programmed Delays (Hold and/or Alarm) are exceeded. A Common Alarm from a Running unit causes a Standby unit to be turned ON, and turns OFF the Running unit if shutdown is selected. A Common Alarm from a Standby unit causes the unit to be unavailable.

### *Common Alarm—Output*

A Form C contact labeled Common Alarm is available for customer use. This relay is energized during the following conditions:

- A Common Alarm input from one of the units
- A Temp/Hum Alarm
- Manual Override ALL ON internal switch
- Emergency Power Operation mode
- Emergency Power OFF

The Common Alarm is de-energized by the Silence pushbutton if DIP switch 1-7 is ON.

### *Control Lockout*

A Form C contact labeled (optional) Control Lockout is available for customer use. This relay is energized during the following conditions:

- Manual Override internal switch (all units on)
- Emergency Power Operation mode

***Delay***

Refer to Alarm Delay, Hold Delay, and Restart Delay.

***E key***

The Enter key <E> at the local control panel serves two functions:

- Causes data entered in setup display pages to be stored in the RAC2-8 permanent memory.
- Causes selection of next unit on multi-unit displays.

***Emergency Power OFF (EPO)***

EPO can be initiated from a remote switch wired to the RAC2-8. This user input causes all units to be turned OFF immediately. RAC2-8 control power is maintained. This Normally Closed contact must be Open for 0.5 seconds for the input signal to be detected.

After the input signal is removed (closed), the alarm must be manually cleared. Then all units programmed to be Running are started sequentially, separated by the Restart Delay.

***Emergency Power Operation***

This user input activates a separate mode for operating on an emergency power source (a UPS system or standby generator) which may have limited capacity. Only units selected to be ON during this mode are running. Select ON units for this mode from the display. Autochangeover, Autosequencing, and Standby Testing are inactive during this mode to reduce power load. Units that are OFF during this mode will remain OFF until normal mode is resumed. This mode also energizes both lockout relays, Humidity and (Optional) Control.

***Force ON***

To manually turn a unit ON from the display. Refer to Override.

***Force OFF***

To manually turn a unit OFF from the display. Refer to Override.

***Hold Delay***

Delay after turn ON of a Standby unit to allow the newly started unit to gain control. During the Hold Delay alarms from this unit **and all other units** are ignored. This delay begins when any changeover Occurs, either in Autosequence or Standby Test mode. An active Hold Delay can be monitored at the display. At the end of the Hold Delay, the Alarm Delay time begins. The Hold Delay is user selectable from the display.

Range—0.1 to 60 minutes, selectable in increments of 0.1 minute (6 seconds).

### ***Humidity Alarms***

Humidity alarms are caused when the humidity detected by the remote sensor in Zone 1 exceeds the programmed High or Low trip-point. Trip-points are selected in 1% RH increments from the display. Entering 00 disables an alarm. A Humidity Alarm activates the Common Alarm output.

High Range—up to 80% RH.

Low Range—down to 20% RH.

### ***Humidity Lockout***

A Form C contact labeled Humidity Lockout is energized when a humidity reading exceeds a lockout trip-point. The relay is de-energized when humidity drops to 2% RH below the High Humidity Trip-point, or when humidity rises to 2% RH above the Low Humidity Trip-point. To use this contact for a single control function (increase or decrease humidity) disable one of the Humidity Alarms.

### ***Inactive Unit***

An inactive unit is one that is not programmed to the RAC2-8 system. This appears in an error message if you try to Override a unit that the system does not recognize.

### ***Interval***

The Interval is the time period (in days) used to program the Autosequencing and Standby Testing functions. The interval is user selected from the display. Range—0 to 99 days.

### ***Labels***

Each unit may be labeled with a 2 digit number from 01 to 99. If you prefer something other than 01 through 08, unit labels can be selected from the display.

### ***Manual Override***

A switch located inside the RAC2-8 enclosure turns all units ON. This action also annunciates an alarm, energizes the Common Alarm output relay, and energizes the Control Lockout relay. To return to normal operation, turn this switch off and clear the alarm. Refer to Override for manual operations from the display.

### ***Modem***

The RAC2-8 includes an EIA-232 modem port to provide remote display of alarms. This same port also allows system monitoring and programming from a remotely located terminal. Operation from a remote terminal requires a Password after the “LOG ON: ” prompt. If a remote terminal is active, alarms are displayed at the terminal **instead of being dialed out**. The modem selections such as phone number, redial interval, etc., are made from a local or remote terminal. Modem baud rate is selected using switches inside the RAC2-8 enclosure.

*Normal Temperature*

Refer to Temperature Staging.

*Override*

The RAC2-8 allows manual control of units from the display and also from switches inside the enclosure. To manually turn all units ON refer to Manual Override. To manually select units to be ON during a control power failure refer to Power Failure Mode.

Manual Override control from the display includes Force ON, Force OFF, and Restore to normal operation. If any unit is Forced ON or OFF a warning message is recorded and the Alarm Present light is illuminated, but the audible alarm (horn) is not sounded. Changes of status messages are displayed at a local terminal if one is connected.

While an Override screen is displayed, alarm messages are stored but not displayed.

**Force ON of any unit**

Selected from the Override screen at the display. This action causes the selected unit to be turned ON and held ON until further action is taken. The unit remains ON until it is Forced OFF or Restored to normal.

**Force OFF of any unit**

Selected from the Override screen at the display. This action causes the selected unit to be turned OFF and held OFF until further action is taken. The unit remains OFF until it is Forced ON or Restored to normal.

**Restore to normal**

Selected from the Override screen at the display. This action returns the selected unit to the programmed control of the RAC2-8. The unit returns to its operating status (Running or Standby) as defined in Unit/Zone Setup.

*Password*

A four digit number used to limit access to setup information and clearing of alarms. A Password (if active) is required for entry to the Main Menu. Assign a new Password from the display. A Password of "0000" disables the Password function at the local display: "TERM" disables the password at a local terminal. The Password is **always** required for a remote terminal (through a modem).

*Power Failure Mode*

During a failure of power to the RAC2-8, units can be programmed to be ON by manually setting jumpers inside the enclosure. This assumes that power will be available to the units. When power is restored to the RAC2-8, all units programmed to be Running during normal operation are sequentially started, separated by the Restart Delay.

Compare this mode with Emergency Power operations which is selectable from the display and applies to power being available from a standby source.

***Restart Delay***

The length of time between a request to turn ON a unit and when the unit is actually turned ON. Also the length of time between the start of each successive unit after power is applied or restored. This delay prevents an excessive inrush current demand on the power source. Restart Delay is typically very short and is user selectable from the display. Range—0.1 to 60 minutes, in increments of 0.1 minute (6 seconds).

***Restore***

To return a Forced ON or Forced OFF unit to normal control. Refer to Override.

***Running Units***

The units selected to be ON during an operating mode. Select Running units from the display. Units not selected for Running status are given Standby status. Running units can be turned OFF by Autochangeover, Autosequencing, or Standby Testing.

***Shutdown***

When a Running unit is in an alarm condition, it can be programmed to remain running or be shut down. Select Shutdown (Yes or No) from the display.

***Site ID***

The user assigned identification of this facility (up to 20 characters). The Site ID is included in alarm messages dialed out by the modem. Assign the Site ID from the terminal.

***SiteScan***

A Liebert site monitoring system. The RAC2-8 sends information to SiteScan if a system is connected to the EIA-422 port.

***Standby Testing***

When Standby Testing is ON the RAC2-8 periodically starts the Standby unit(s) to test operation. The time between these tests is the Interval. Standby Testing ON/OFF, Interval (in days), and time of day for testing are user selected from the display. Standby Testing and Autosequencing cannot both be ON at the same time.

Each time a test is performed, the Standby unit(s) operate for a time equal to the Hold Delay plus the Alarm Delay. At the end of this period operation returns to the Running unit(s). If an alarm occurs and does not correct itself by the end of the test time, an alarm is displayed and annunciated.

***Standby Units***

The units selected to be OFF during an operating mode. Select Standby units from the display. Units not selected for Standby status are given

Running status. Standby units can be turned ON by Autochangeover, Autosequencing, or Standby Testing.

### ***Temperature Alarms***

Temperature alarms are caused when the temperature detected by the remote sensor in Zone 1 exceeds the programmed High or Low trip-point. Trip-points are selected in 1 degree increments from the display. Entering 00 disables an alarm. A Temperature Alarm activates the Common Alarm output.

High Range—up to 90°F (32°C).

Low Range—down to 50°F (10°C).

### ***Temperature Sensitivity***

Refer to Temperature Staging.

### ***Temperature Staging***

The RAC2-8 can be programmed to use Standby units, along with Running units, for increased capacity in Zone 1. If more than one Standby unit is available, these units can be staged to turn on as temperature increases. Temperature Staging is selected from the display. This mode is the best way to control room temperature after recovering from a power failure (a remote T/H sensor is required).

#### **Normal Temperature**

The temperature to be maintained when Temperature Staging is ON. Normal Temperature is selected from the display.

Range—50 to 90°F (10 to 32°C), in 1 degree increments.

#### **Temperature Sensitivity**

The number of degrees from the Normal Temperature which causes the next Standby unit to be turned ON. As temperature approaches Normal, the Standby units are turned OFF in first-on/last-off order. Sensitivity is selected from the display in 1 degree increments, and is a small number.

### ***Terminal***

A local terminal can be connected directly to the RAC2-8 or a remote terminal can be connected through modems. Two EIA-232 ports are available at the enclosure. All of the status information and control functions available at the RAC2-8 local display are available from the terminal. An additional function available at the terminal is Set Modem. The terminal also displays a status message with time and date stamp whenever a unit changes status (OFF or ON). The terminal baud rate is selected by using switches inside the enclosure.

### ***Units***

Each environmental control system connected to the RAC2-8 is called a Unit. Each Unit is located in a Zone, is assigned a Label, and a status (Running or Standby). All of these selections are made from the display (for 2 to 8 units). The RAC2-8 monitors Unit Common Alarms and turns Units ON or OFF from the automatic control program or from manual inputs.



***Zones***

Each area (room) controlled by the RAC2-8 is called a Zone. Zones are numbered 1 through 4. Zone 1 should be the largest or most important room, it is the only Zone that can be monitored by a Temp/Hum sensor, and the only Zone that can be controlled by Temperature Staging. Each Zone contains at least one Unit.

## Section 5: Installation

*Refer to Figure i on Page iv in the beginning of this manual for a typical system configuration. Refer to the following drawings (including notes) for details of wire terminations and switch settings for inputs and outputs used at your installation.*

*Call Liebert Environmental Support at 1-800-543-2778 if you require any assistance for the installation or operation of your RAC2-8 Autochangeover controller.*

Select a location for the RAC2-8 that is convenient for both operation and cable routing. If the application at your installation is critical, the location should also provide limited access to the controller.

The RAC2-8 enclosure is surface mounted using four 1/4 in. bolts. The power cord is factory wired. Note that the use of a 220 VAC 50/60 Hz power source must be selected when the unit is ordered. This is not a field selectable option. Two EIA-232 ports are available at the bottom of the enclosure. All other customer cables enter through knockouts at the bottom of the enclosure.

The RAC2-8 includes a lithium backup battery for control memory. The battery is disconnected from the system for storage and shipment. Set DIP switch 2-8 to ON to connect the battery.

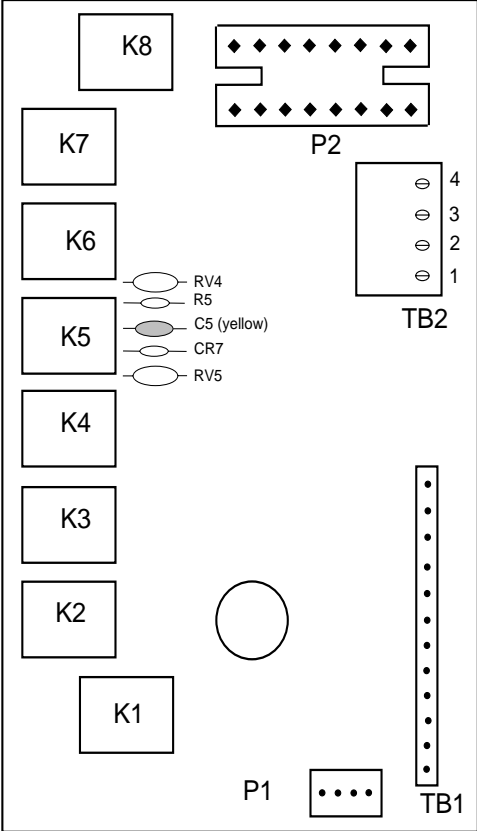
The RAC2-8 may show an alarm from a Liebert DataMate, mini-MATE, and/or mini-MATE Plus unit when an alarm condition does not, in fact, exist. If you are using or plan to use the RAC2-8 with the Liebert DataMate, mini-MATE, and/or mini-MATE Plus, remove the C5 capacitor at the K5 common alarm relay to avoid false alarms:

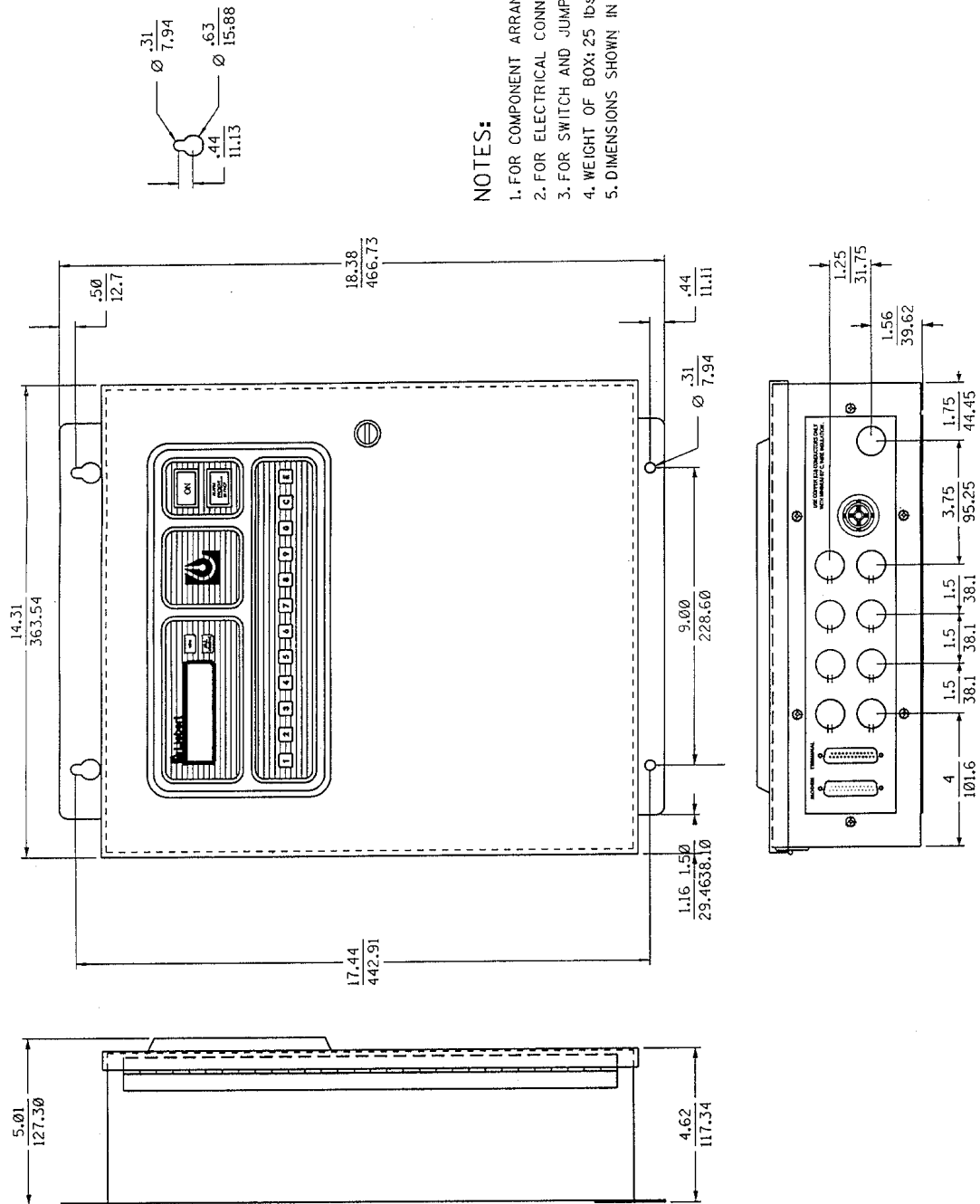
### Installation (cont'd.)

1. Put on an anti-static wrist strap.
2. Turn the main disconnect switch OFF.

- 3. Using wire cutters, carefully snip and remove the C5 capacitor at the K5 common alarm on the interface board. Refer to the diagram below for the location of the C5 capacitor.

Interface Board  
4C13521G  
(Located in the  
DataMate,  
mini-MATE, or  
mini-MATE Plus)





**NOTES:**

1. FOR COMPONENT ARRANGEMENT SEE 154539.
2. FOR ELECTRICAL CONNECTIONS SEE 154540.
3. FOR SWITCH AND JUMPER SETTINGS SEE 154541.
4. WEIGHT OF BOX: 25 lbs. (11.34 kg).
5. DIMENSIONS SHOWN IN INCHES / MILLIMETERS.

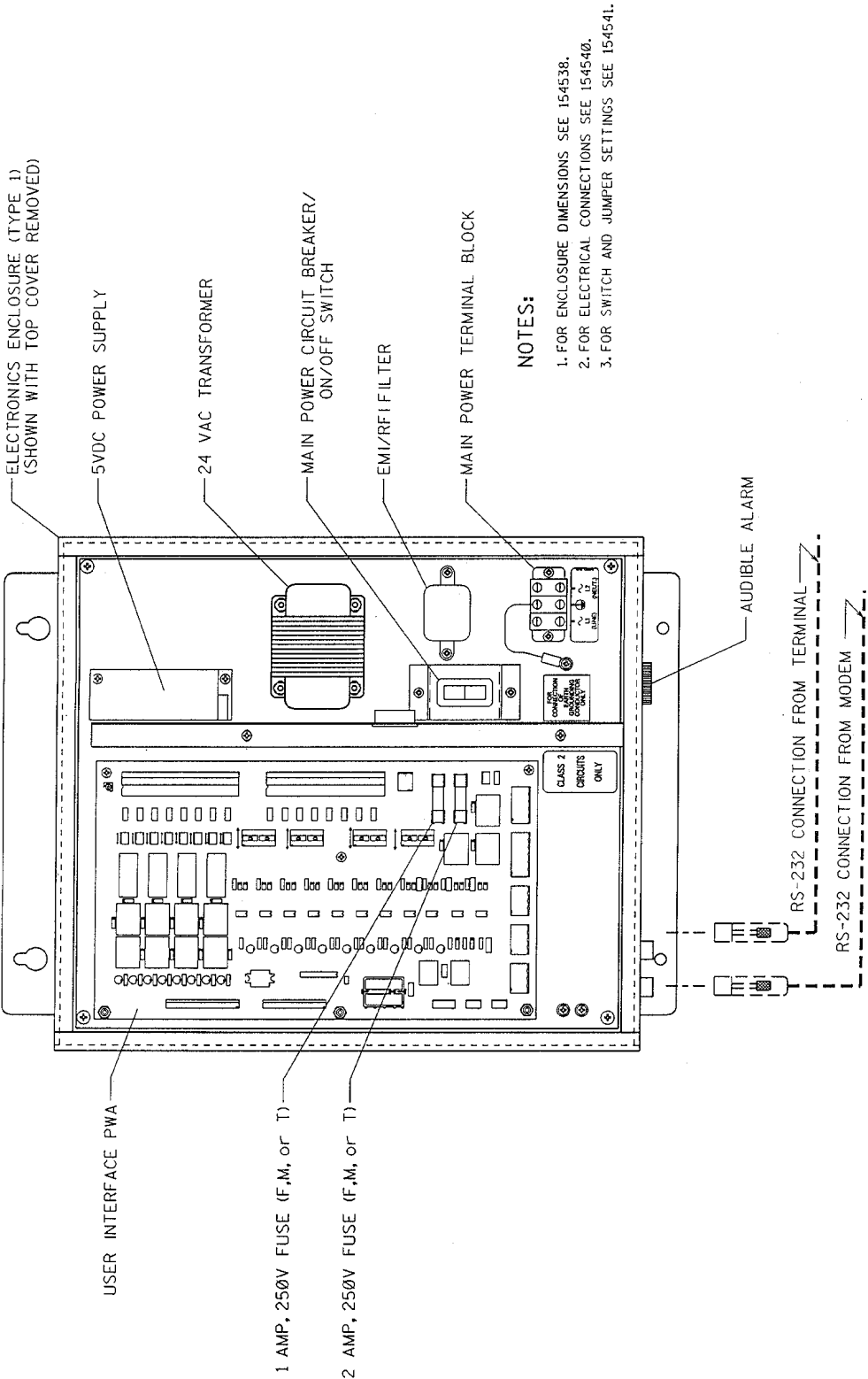


Figure 5-2. RAC2-8 Component Arrangement

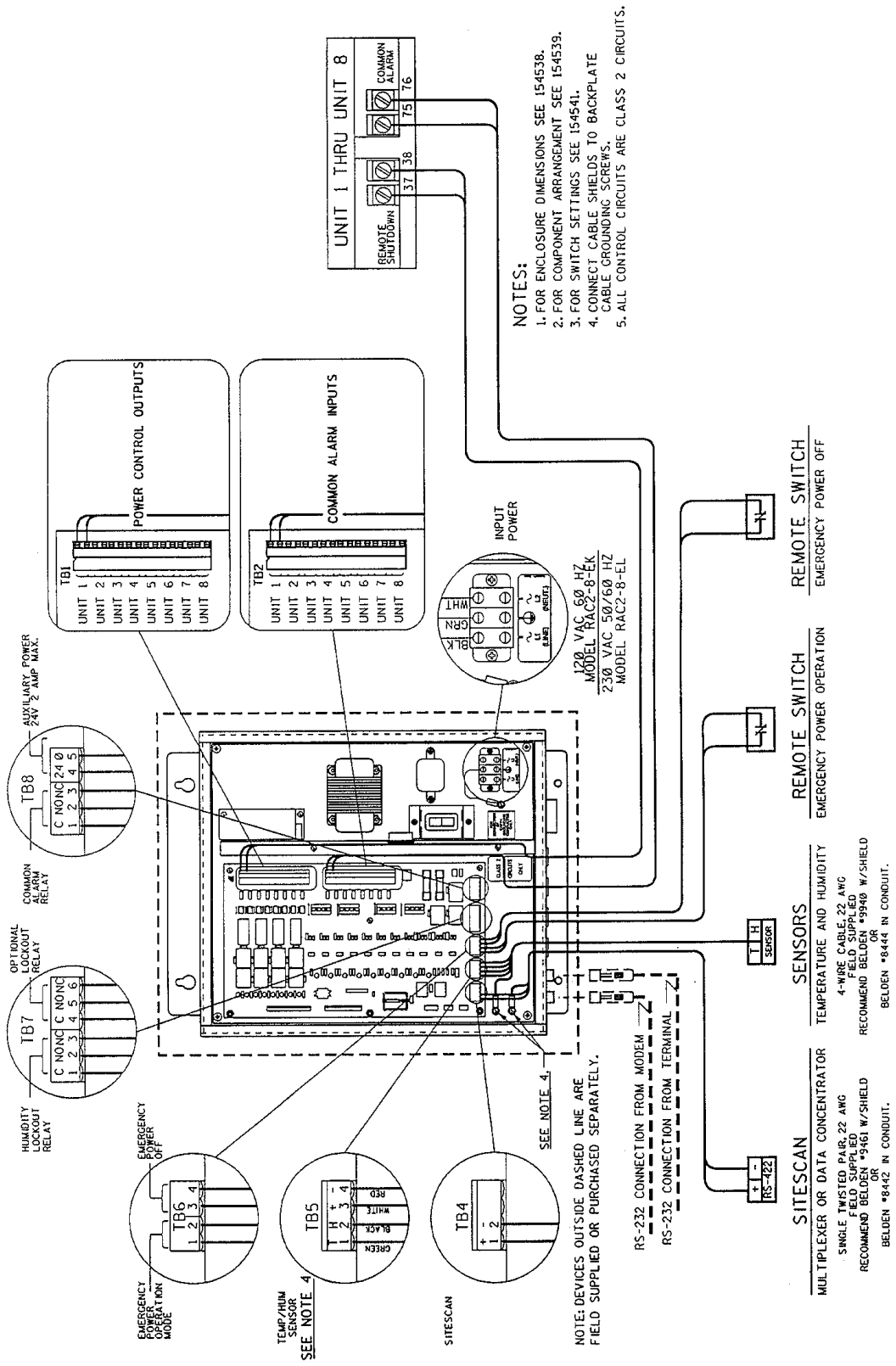


Figure 5-3. RAC2-8 Connection Diagram

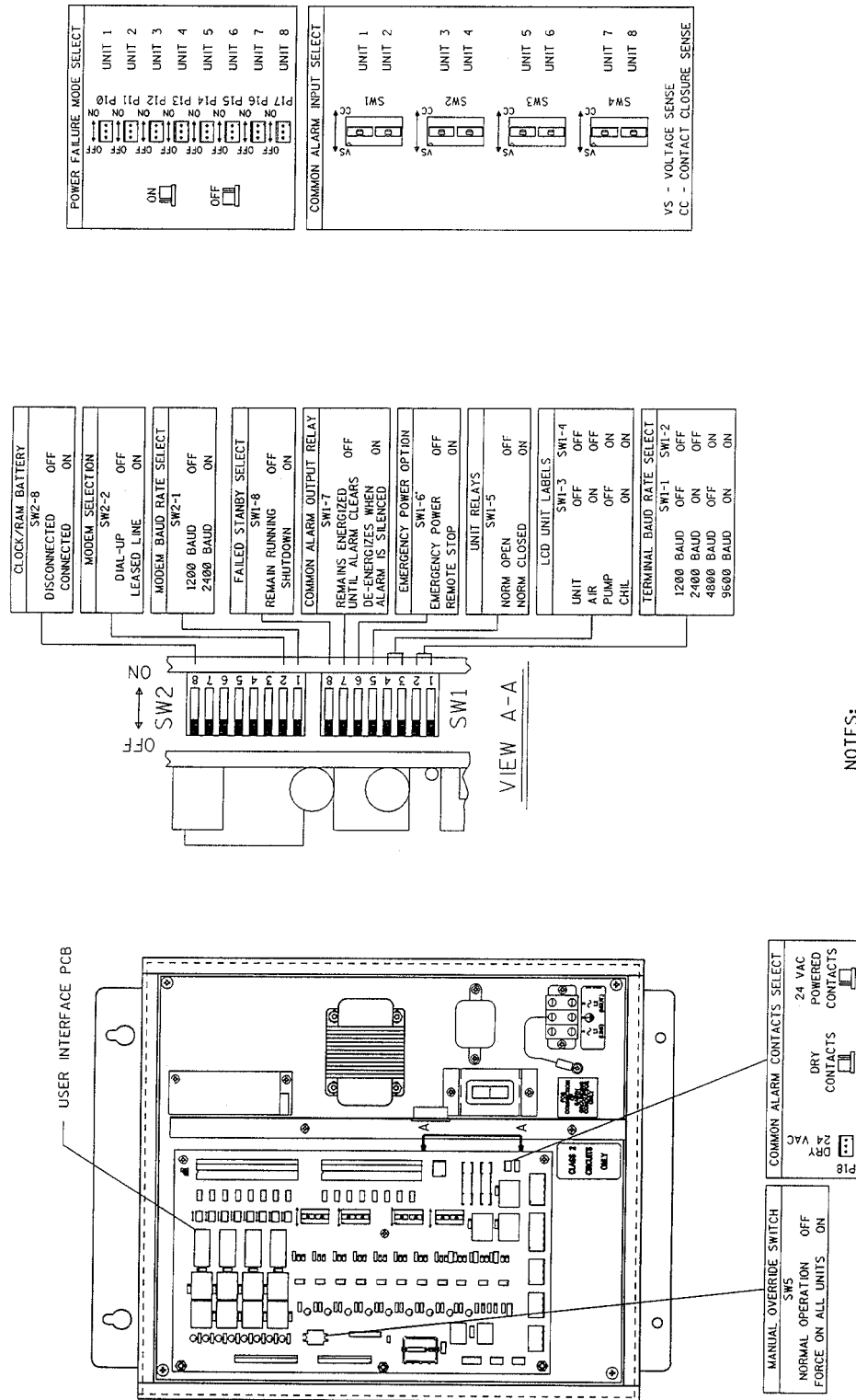


Figure 5-4. RAC2-8 Switch and Jumper Settings