CONTROLS
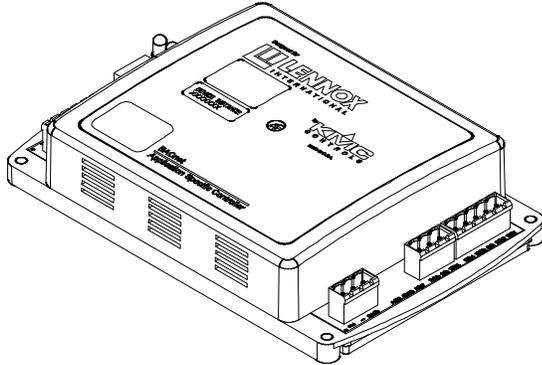KITS AND ACCESSORIES

Technical
Publications
Litho U.S.A.

507042-01
6/2013
Supersedes 2/2013

KMC BACnet® Module Kits

Installation Instructions for BACnet® Module Kits (96W14, 96W15 and 96W16) used with KG/KC/KH Rooftop Units

⚠WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.

Installation and service must be performed by a licensed professional installer (or equivalent) or service agency.

Shipping and Packaging

- BacNet assembly (1)
- Installation Instruction (1)
- Bag assembly (96W14) containing:
  #10-16 X 5/8 screws (3)
  Wiring diagram sticker (1)
- Bag assembly (96W15) containing:
  #8-32 x 1/2 screws (5)
  Wire-tie insertion (1)
  Wiring diagram sticker (1)
  DDC panel holder (1)
  Latch (1)
- Bag assembly (96W16) containing:
  #10-16 X 5/8 screws (2)
  Wire-tie insertion (1)
  Wiring diagram sticker (1)

General

The BAC-8304-56 controller is a custom BACnet application specific controller intended for use on KG/KC/KH rooftop units. The BACnet controller (BAC-8304-56) was developed to communicate with building automation systems that support the BACnet Application Specific Controller (B−ASC) device profile.

The BACnet controller is connected to the unit through **TB1**.

Zone temperature may be supplied from a local sensor, either a STE-8001 Digital Sensor or STE-6011 Discrete Sensor, or mapped from a third-party BACnet device to the BACnet controller BAC-8304-56. As part of a complete facilities management system, the BAC-8304 controller provides precise monitoring and control of connected points.

Network Cable

Instance ID will ship from the factory as a randomized, unique number. The system integrate may change this number through the STE-8001 digital sensor if desired.

The controller communicates through a MS/TP master RS-485 connection at the following baud rates: 9600, 19.2K, 38.4K, and 76.8K.

The controller is capable of auto-baud to determine the baud-rate of the connected MS/TP network. The auto-baud is active at the time the controller is powered up. Removable and locking terminal blocks will accept 14 to 22 AWG wire. It is compatible with twisted pair, shielded 22AWG minimum cable such as Belden part numbers 8761, 88761 and catalog numbers 27M19, 94L63 or 68M25.

FACTORY COMMUNICATION CONFIGURATION

- The MAC address will be 3.
- The instance number will be randomized based on the controller serial number.

The network cable should be routed using best practices to avoid induced noise. Do not route alongside high voltage wiring or in proximity to high−voltage or high−frequency devices, such as ignition controls and variable frequency drives.

Connect the **-A** terminal in parallel with all other - terminals. Connect the **+B** terminal in parallel with all other **+** terminals. Connect the shields of the cable together at each controller using the **S** terminal. See figure 1 for MS/TP network wiring. It is recommended that the physical network be arranged in a daisy-chain topology.

IMPORTANT !

A qualified systems integrator with adequate training and experience is required to integrate and commission the KMC BACnet module into a third party BACnet building automation system. Front end software is used to validate the system configuration when the controller is connected to the BACnet Network.

Network Bus Termination

When the BACnet® module is at the end of a daisy-chain of the EIA-485 wiring segment, the controller must have end-of-line termination installed for proper network operation. Set the network end of line (EOL) DIP switch **S3** to **ON** state for network termination. (see figure 3)

Installing BACnet Assembly

1. Disconnect all electrical power to unit.
2. Open compressor section access doors.
3. Install BACnet assembly:
   - **A** **A Box Units**.- Position the BACnet assembly in front of control panel and secure the assembly with the provided three #10−16 x 5/8" SMS screws to the compressor wall located at the right-side of control panel (see figure 5).
   - **B** **B Box Units**.- Position the BACnet assembly in front of control panel and secure the assembly with the provided three #8−32 x 1/2" TFS screws to the control box located at the right-side of control panel (see figure 6).
   - **C** **C Box Units**.- Position the BACnet assembly so that the BACnet module faces the control panel. Align dimples or knock−outs in unit mullion with engaging holes in DDC mounting bracket. Secure with the provided two 5/8" sheet metal screws (see figure 7).
4. Connect the BACnet network wiring to the BACnet module as shown in figure 1 to the BACnet network connector shown in figure 2.
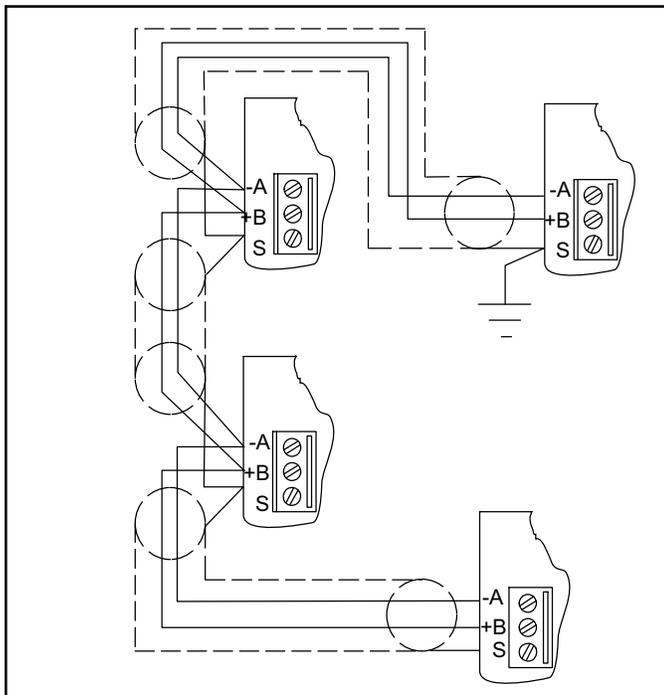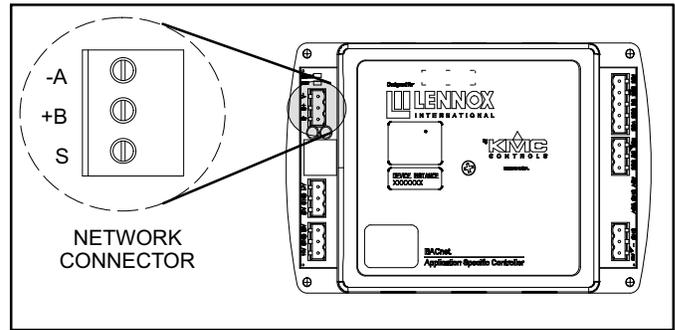

Figure 1. MS/TP Network Wiring

Figure 2. Network Connection

5. To configure the BACnet MAC address, see *System Integration* on page 4.
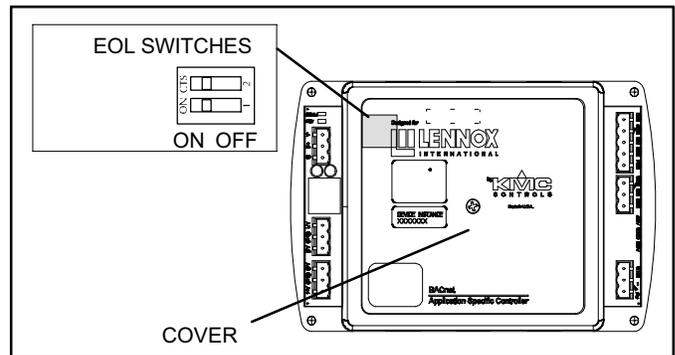6. Set EOL switch to **ON** if the BACnet module is at the end of the daisy chain network.

Figure 3. BACnet End-of Line Switches S3

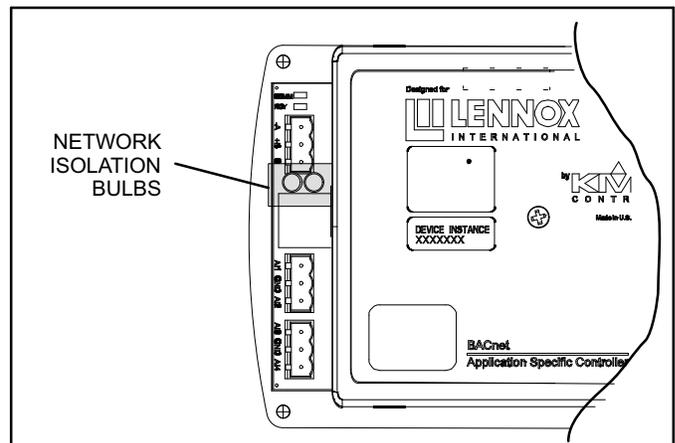7. Verify that the network isolation bulbs are in installed and secure.

Figure 4. BACnet End-of Line Switches S3

8. When power-up, the BACnet module will begin to communicate provided the network has been correctly configured.
9. Check for the status LEDs (Green/READY, Amber/COMM).
10. To configure the BACnet network refer to the *BACnet KMC Installation and Operation Manual*.
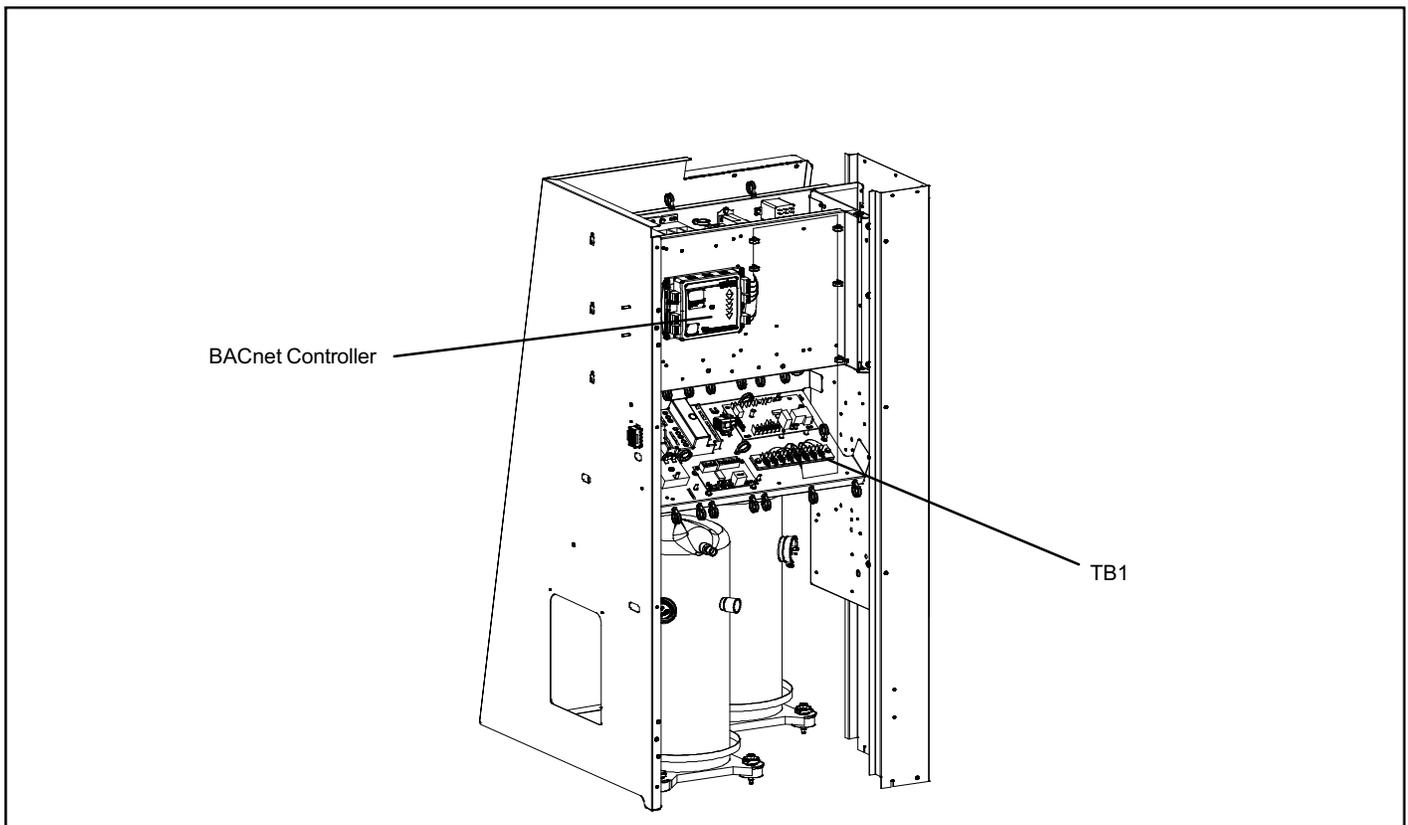
Jack Plug Connections

1. Route harnesses coming from sub−assembly as shown on figure 5 for A Box, figure 6 for B Box and figure 7 for C Box units.

2. Connect wires marked **TB1** to terminal strip **TB1**.

NOTE - Wires are labeled (hot stamped) to the plugs to identify wire positions.

TB1

BACnet Controller

Figure 5. A-Box

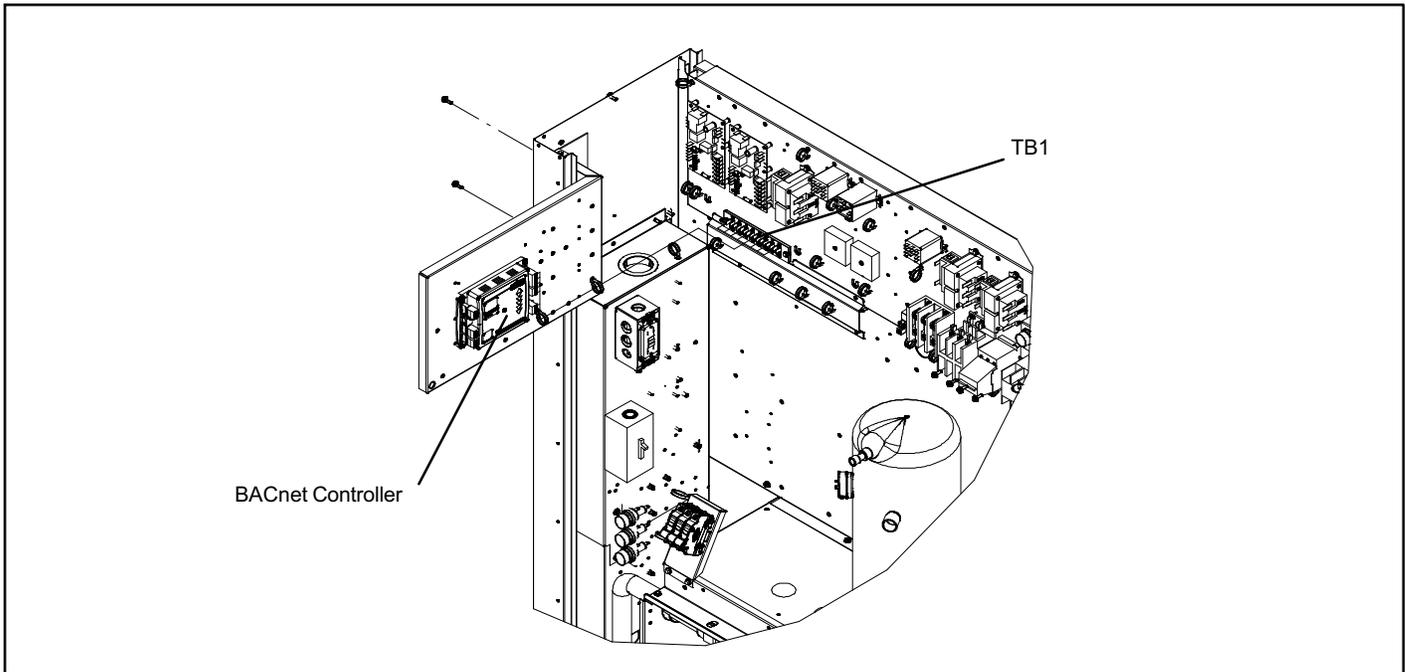BACnet Controller

TB1
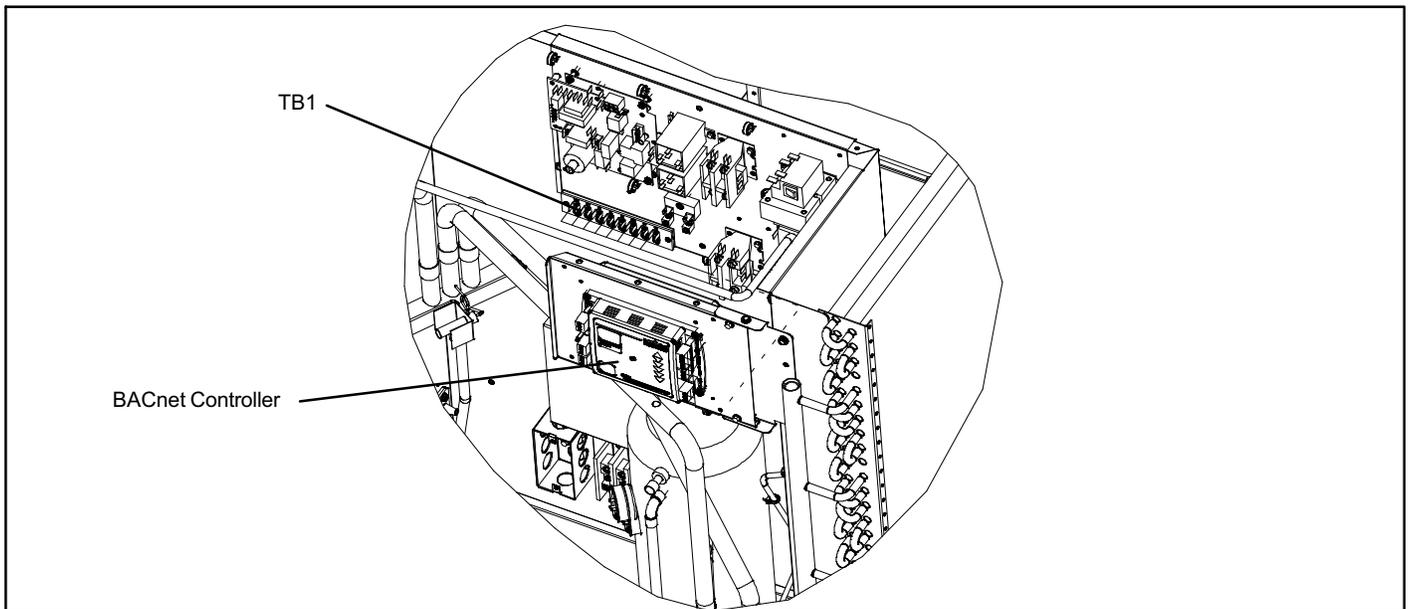
Figure 6. B-Box

Figure 7. C-Box

Field Configuration and Setup

Configuration of the factory default application will be accomplished by either user input through the digital wall sensor (STE-8001) or BACnet writes to the appropriate points.

Communication configuration of the MAC address is accomplished by DIP switches. Device instance number and baud-rate is configured through the digital wall sensor.

SYSTEM INTEGRATION

The following steps should be followed to integrate the BAC-8304-56 into a existing BACnet network:

1. Set BACnet MAC address.
   A Remove controller cover. One screw in the center of the cover secures the cover in place.
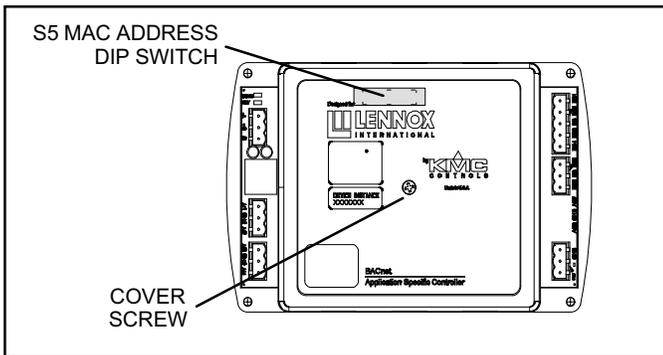
Figure 8. BACnet MAC Address Dip Switches Location (S5)

B Set the DIP switch **S5** (see figure 9) to the desired address combination. The individual DIP switch channels will be summed to determine the MAC address (e.g. switches **1**, **2**, and **16** active will produce a MAC address of **19**).

Figure 9. BACnet MAC Address Dip Switches

C Re-install the controller cover.

NOTE - If the controller is powered when DIP switches are changed, the control will need to be power cycled to make the MAC address change active.

2. Set the BACnet Instance Identification (if desired).
   A Ensure the STE-8001 is connected to the controller.

B Press and hold the increment and decrement buttons together until the display changes. The user will be prompted for the Level 2 password, or if a Level 2 password is not set, the user will be taken to the COMM display.

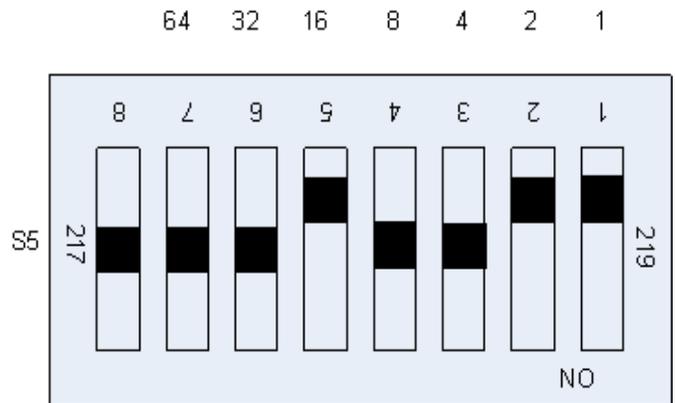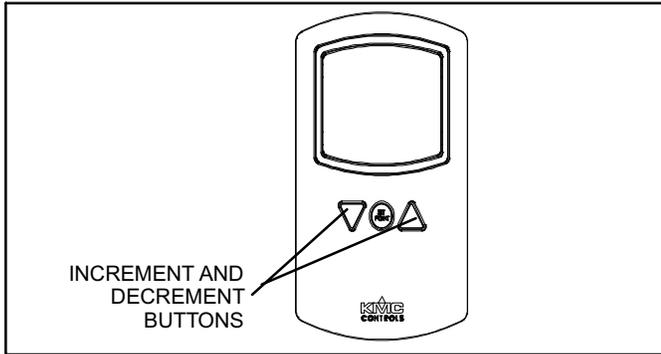INCREMENT AND DECREMENT BUTTONS

Figure 10. STE-8001W (97W23)

C Use the increment/decrement buttons to navigate to the COMM commissioning function. When COMM is displayed, press the set point button.

D When **D** identification appears on the screen, the Instance identification may be changed. Use the increment/decrement buttons to change the first digit of the **D** identification. Press the set point button to index to the next digit. Repeat for all seven digits.

E After the seventh digit is set, pressing the set point button will advance the user to the BAUD menu.

3. Set the MS/TP Baud Rate (if desired).
   A While in the BAUD display, press the increment/decrement buttons to select the desired baud rate. Press the set point button to save the current settings. The display returns to the COMM root menu.
   B Press the increment or decrement buttons to select CNFG (to change other controller settings) or EXIT to exit the configuration menu structure and return to the temperature display.

4. Connect the controller to a BACnet network and verify system configuration with front-end software.

WALL SENSORS

STE-8001 models shall be supported through a modular RJ45 connection.

NOTE - The maximum cable length recommended is 75 feet (between controller and sensor).

Operating the STE-8001

The STE-8001 is a digital wall sensor and control configuration tool. To adjust system parameters, pressing either the increment of decrement button changes the selection, setting, or value. Pressing the set point button saves the setting or value and advances the user to the next display or menu. The home screen, or default screen, is considered to be the temperature display.

NOTE - The STE-8001 sensor will also display system time if a BACnet Time synchronization has been received within the preceding 24 hours.

Password Protection

The STE-8001 allows two levels of password protection: level 1 and level 2. Passwords are 4-digit numbers, set in the advanced menu (described below). If the password is non-configured (i.e. set to all zeros, **0000**), no password is required to advance the display into additional displays.

The user must enter level 1 password is required to adjust the occupied cooling and heating set points. The user must enter the level 2 password to adjust any controller configuration parameter (communication or sequence parameters). The default Level 1 and Level 2 passwords are **0000**.

NOTE - Passwords may be reset using DIP switch #8 on the BAC-8304-56 controller. To reset the password, DIP switch #8 shall be placed in the ON position while the controller is not powered. The controller is powered up until the RDY LED blinks in rapid sequence.
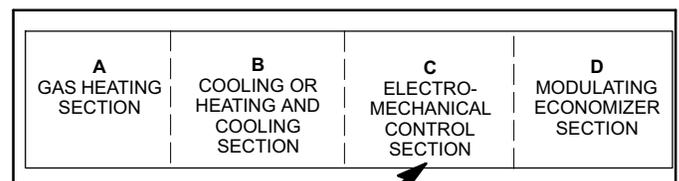
*Power should be removed from the controller and DIP switch #8 returned to the OFF position. The controller can then be powered normally and the passwords will be reset to **0000**.*

Configuring Set Points with the STE-8001

To enter or change the occupied set points, a level 1 password is required (if a level 1 password has been set). If a password is **0000**, the user is not prompted to enter the password before moving into the menu structure. Starting from the temperature display, press the set point button. Using the increment/decrement buttons, enter the level 1 password (if configured). If the correct password is entered, or no password is configured, the display will advance to the occupied cooling set point display. Using the increment/decrement buttons, change the occupied cooling set point. Once the desired set point is entered, press the set point button. The display will advance to the occupied heating set point display. Repeat the process to enter the occupied heating set point. Once the occupied heating set point is entered, pressing the set point button will return the display to the temperature display.

Wiring Diagrams

1. Controls contractor completes field wiring connections to optional system components shown in dotted lines in figures 12 through 14.

2. Wiring diagram sections are affixed to inside of unit panel in alphabetical order. Figure 11 shows an example of a complete system diagram on an installation consisting of a unit with an electromechanical or electronic control system and a modulating economizer. Affix the C section wiring diagram, provided, over the top of the existing C section wiring diagram.

| A GAS HEATING SECTION | B COOLING OR HEATING AND COOLING SECTION | C ELECTRO-MECHANICAL CONTROL SECTION | D MODULATING ECONOMIZER SECTION |

AFFIX C WIRING DIAGRAM SECTION HERE

Figure 11. Affixing System Wiring Diagram

24V POWER

A146

BLOWER(G) — TB1 G
HEAT 1(W1) — W1
HEAT 2(W2) — W2

COOL 1(Y1)

COMM. CABLE
STE-8001
PC (RJ45)

SPACE SENSOR — AI1
— GND
ROOM SETPOINT — AI2
DISCHARGE TEMP — AI3
— GND
DISABLE SYSTEM — AI4

BO2
BO1
BO5
BO6
SC
SC

BO4

BO3

GND

24V COMMON

TB1 R
Y1
OC

A63
1
8
7
2

Y2

C

△2 J3
△1 P3

6
1
2
3
4
5
8
9
10
11
12
13
14
15
7

KEY	COMPONENT
A146	CONTROL, BACNET
A63	SENSOR, CO2
J3	JACK, UNIT ECONOMIZER
P3	PLUG, ECONOMIZER BYPASS
TB1	TERMINAL STRIP, CLASS II VOLTAGE

△1 REMOVE P3 WHEN ECONOMIZER IS USED

△2 J3 MAXIMUM LOAD 20VA 24VAC CLASS II

→ DENOTES OPTIONAL COMPONENTS
— — — CLASS II FIELD WIRING

WIRING DIAGRAM 01/13
01/13
537562-01
CONTROLS
CONTROL FOR
BACNET MODULE (A-BOX)
SECTION C   REV 0
Supersedes   New Form No.
                537562-01
©

Figure 12. Control for BACnet Module (A-Box)
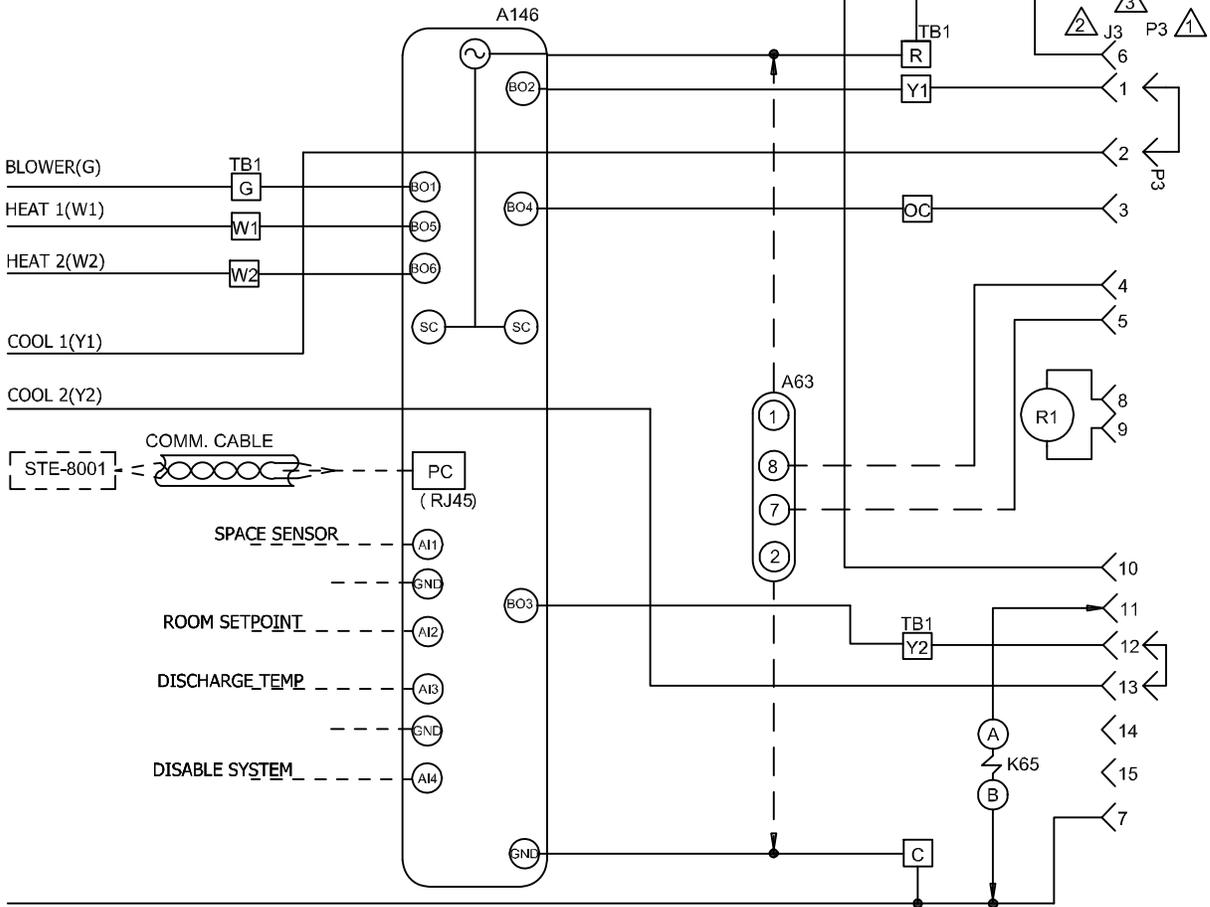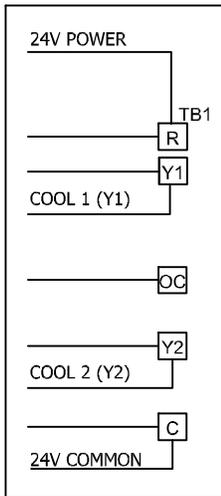
Page 6

A146

BLOWER(G)
HEAT 1(W1)
HEAT 2(W2)
COOL 1(Y1)
COOL 2(Y2)

TB1
G
W1
W2

BO1
BO5
BO6
SC

~
BO2
BO4
SC

TB1
R
Y1

OC

J3   P3

6
1
2
3
4
5

A63
1
8
7
2

R1

8
9

10

STE-8001   COMM. CABLE   PC (RJ45)

SPACE SENSOR — AI1
— GND
ROOM SETPOINT — AI2
DISCHARGE TEMP — AI3
— GND
DISABLE SYSTEM — AI4

BO3

TB1
Y2

11
12
13

A
K65
B

14
15
7

GND

C

24V COMMON

24V POWER

TB1
R
Y1
COOL 1 (Y1)

OC

Y2
COOL 2 (Y2)

C
24V COMMON

CONNECTION SCHEME FOR KCA, KGA AND KHA
092 THROUGH 150 UNITS WITHOUT
ECONOMIZER ONLY

KEY	COMPONENT
A146	CONTROL, BACNET
A63	SENSOR, CO2
J3/P3	JACK/PLUG, UNIT ECONOMIZER
K65	RELAY, EXHAUST FAN
R1	SENSOR, MIXED AIR OR SUPPLY AIR
TB1	TERMINAL STRIP, CLASS II VOLTAGE

1 REMOVE P3 WHEN ECONOMIZER IS USED, ONLY ON KCA,
KGA AND KHA 180 THROUGH 300 UNITS.

2 J3 MAXIMUM LOAD 20VA 24VAC CLASS II

3 J3 AND P3 ARE NOT USED ON KCA, KGA AND KHA
092 THROUGH 150 UNITS WITHOUT ECONOMIZER

→ DENOTES OPTIONAL COMPONENTS
— — — CLASS II FIELD WIRING

WIRING DIAGRAM   01/13
537563-01
CONTROLS
CONTROL FOR
BACNET MODULE (CAV B & C BOX)
SECTION C   REV 0
Supersedes   New Form No.
537563-01

Figure 13. Control for BACnet Module (CAV B and C Box)
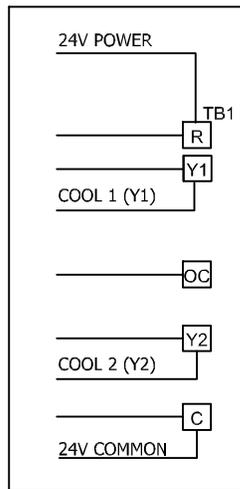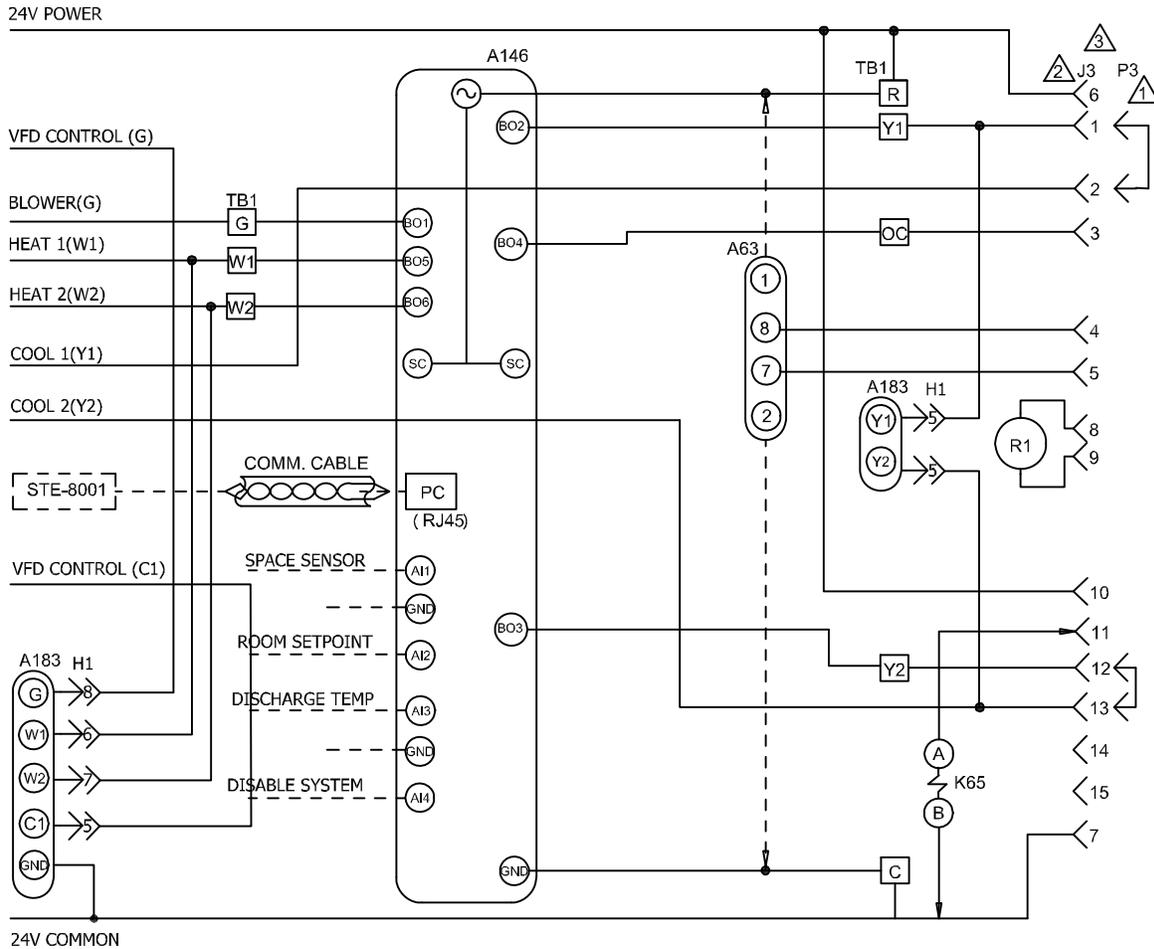
24V POWER

A146

VFD CONTROL (G)

BLOWER(G) TB1 G

HEAT 1(W1) W1

HEAT 2(W2) W2

COOL 1(Y1)

COOL 2(Y2)

STE-8001 COMM. CABLE PC (RJ45)

VFD CONTROL (C1) SPACE SENSOR AI1
GND
ROOM SETPOINT AI2
DISCHARGE TEMP AI3
GND
DISABLE SYSTEM AI4

A183 H1
G 8
W1 6
W2 7
C1 5
GND

24V COMMON

TB1 R
Y1
OC

A63
1
8
7
2

A183 H1
Y1 5
Y2 5

R1
8
9

A K65
B

TB1 R
Y1
Y2
C

BO2, BO1, BO5, BO6, SC, SC, BO4, BO3, GND

J3 P3
6
1
2
3
4
5
10
11
12
13
14
15
7

KEY	COMPONENT
A146	CONTROL, BACNET
A63	SENSOR, CO2
A183	CONTROL, VFD BOARD
H1	HEADER 1 ON VFD BOARD
J3/P3	JACK/PLUG, ECONOMIZER OR BYPASS
K65	RELAY, EXHAUST FAN
R1	SENSOR, MIXED AIR OR SUPPLY AIR
TB1	TERMINAL STRIP, CLASS II VOLTAGE

24V POWER

TB1 R
Y1
COOL 1 (Y1)
OC
Y2
COOL 2 (Y2)
C
24V COMMON

CONNECTION SCHEME FOR KCA, KGA AND KHA 092 THROUGH 150 UNITS WITHOUT ECONOMIZER ONLY

1 REMOVE P3 WHEN ECONOMIZER IS USED, ONLY ON KCA, KGA AND KHA 180 THROUGH 300 UNITS.

2 J3 MAXIMUM LOAD 20VA 24VAC CLASS II

3 J3/P3 ARE NOT USED ON KCA, KGA AND KHA 092 THROUGH 150 UNITS WITHOUT ECONOMIZER

DENOTES OPTIONAL COMPONENTS
CLASS II FIELD WIRING

WIRING DIAGRAM 01/13
537564-01
CONTROLS
CONTROL FOR BACNET MODULE (VFD B & C BOX)
SECTION C REV 0
Supersedes New Form No. 537564-01

Figure 14. Control for BACnet Module (VFD B and C Box)