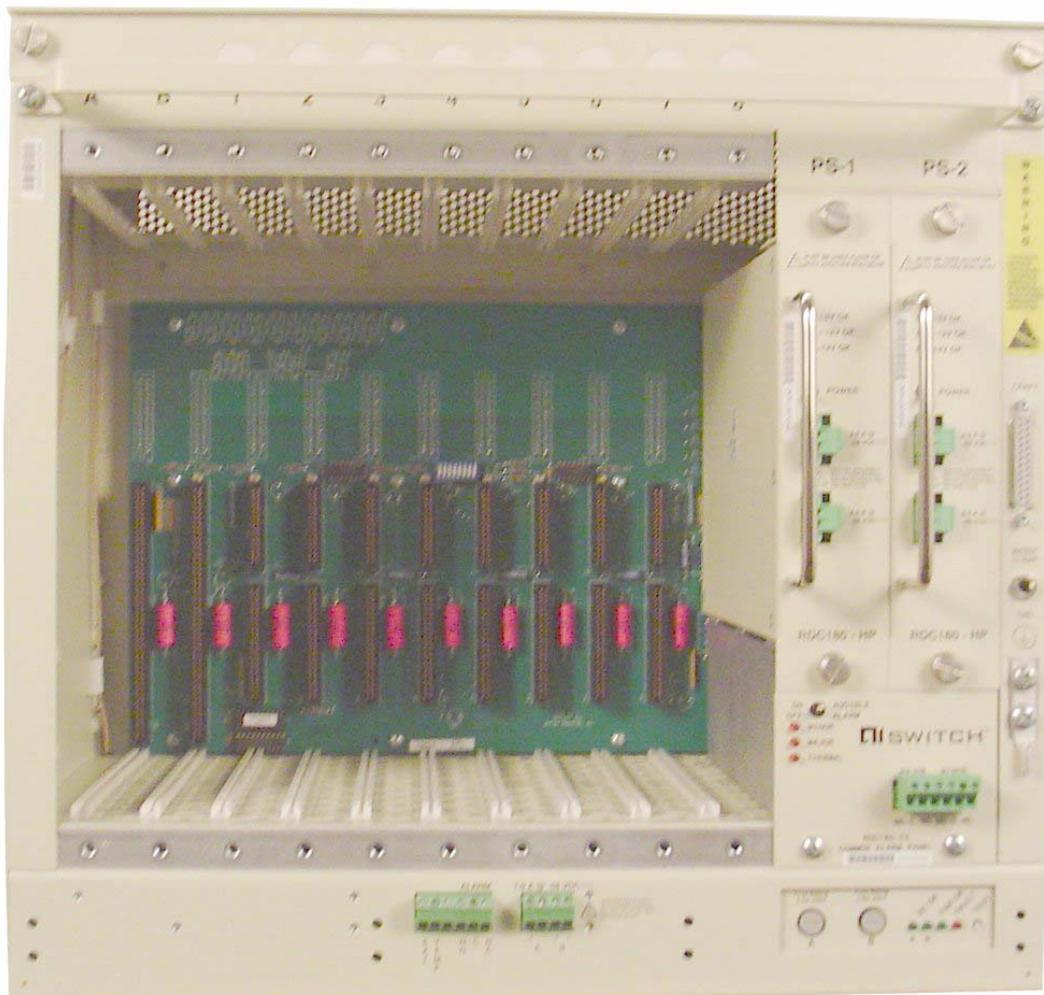


## AI180I Alswitch Series 180 Integrated Chassis Installation Guide





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Kentrox, Inc.  
5800 Innovation Dr.  
Dublin, Ohio USA 43016-3271  
Toll Free: (800) 247-9482  
International: +1 (614) 798-2000  
Fax: +1 (614) 798-1770

20010 NW Tanasbourne Dr.  
Hillsboro, Oregon USA 97124-7104  
Toll Free: (800) 733-5511  
Direct: (503) 643-1681



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## Cautions and Warnings

### Grounding and Electrical Safety



**CAUTION:** Kentrox equipment and its peripherals contain electrostatic sensitive components. Proper handling, shipping, and storage precautions must be exercised:

- You must remove and install cards in a static-free environment. Wear an antistatic wrist strap that is plugged into the AI equipment so you are grounded at the same point as the equipment.
- Do not remove cards from their antistatic plastic bags until you are ready to install them into the chassis.
- Immediately after you remove a card from the chassis, you must insert it into its antistatic bag.
- When the cards are not in use, keep them in their antistatic plastic bags.
- Do not ship or store cards near strong electrostatic, electromagnetic, or radioactive fields.

### Installation



**CAUTION:** For Kentrox equipment to operate safely and correctly, there must be a safety ground strap between the equipment ground bolts and the office ground.

### Environment



**CAUTION:** In the event that AI180I has been subjected to adverse environmental conditions, a service inspection of AI180I should be made to ensure safe operation.

### FCC

The Federal Communications Commission has set limits for emitted radio interference, and AI180I is constructed with this electromagnetic interference (EMI) limitation in mind. AI180I is classified under FCC regulations as a Class A device, that is, a device for use in commercial environments and not in residential areas. This device has been tested and shown to comply with the following FCC rule: Part 15 Subpart J. Operation of this equipment in a residential area may cause interference to radio and TV reception, requiring the user to take whatever steps are necessary to correct the interference.



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Information is available from the FCC describing possible corrective actions. To maintain low EMI levels, we suggest that you use only metal connectors and shielded cable grounded to the frame.

Specifications are subject to change without notice.

## Customer Assistance

Kentrox offers technical support 24 hours a day, seven days a week.

Before you contact Kentrox for assistance, please have the following information available:

- The type of hardware and software you are using
- The error number and exact wording of any messages that appeared on your screen
- What happened and what you were doing when the problem occurred
- How you tried to solve the problem

## Web Site Support

Support is available 24 hours a day using our Web site at:

<http://www.kentrox.com>

## Email Support

Email support is available 24 hours a day. When you use email support, please be sure to include the details of your problem within the email.

To contact Technical Support, send email to:

[techsupport@ainet.com](mailto:techsupport@ainet.com)

## Phone Support

Phone support is available. When you call Kentrox for support, please be sure you are at your computer and have the details of your problem available.

To contact Technical Support, call (866) 480-3571.

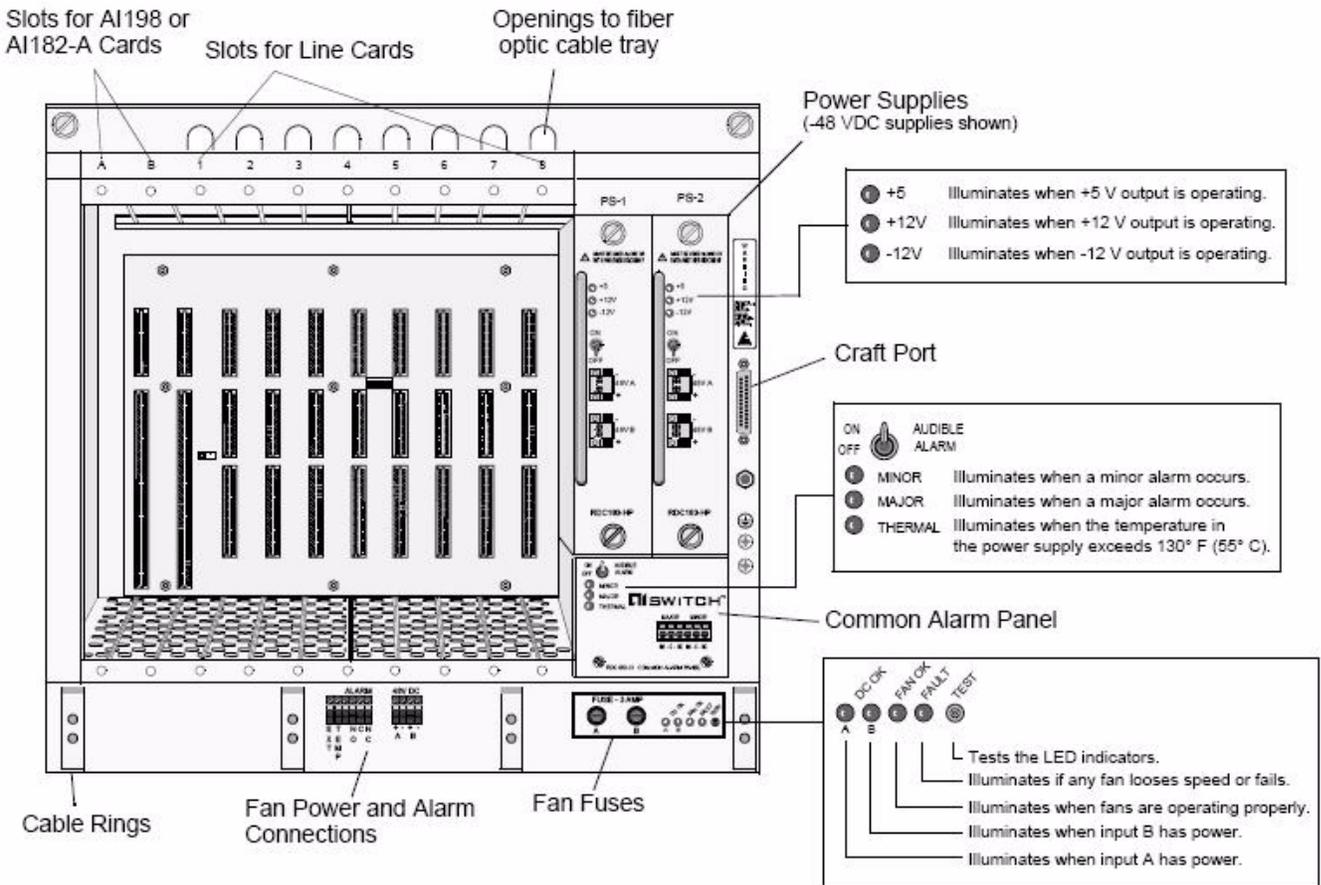
## Kentrox Product Documentation

To order documentation, please contact your sales representative at (800) 247-9482 or +1 (614) 798-2000.

You can also access and view the most current versions of Kentrox product documentation on our Web site at:

<http://www.kentrox.com>

# Front Panel Components



**CAUTION:** Personnel handling cards must wear an antistatic wrist strap and follow electrostatic procedures. For safety and proper cooling, cover all unused slots with a blank cover.

## Required Items

### Tools

- #2 Phillips screwdriver
- 3/64 in. (2.5 mm) slotted screwdriver
- Crimping tool [1/4 in. (6.3 mm) capacity]
- Wire cutter
- Wire stripper
- PC with terminal emulation software such as Procomm (optional, used for configuration)

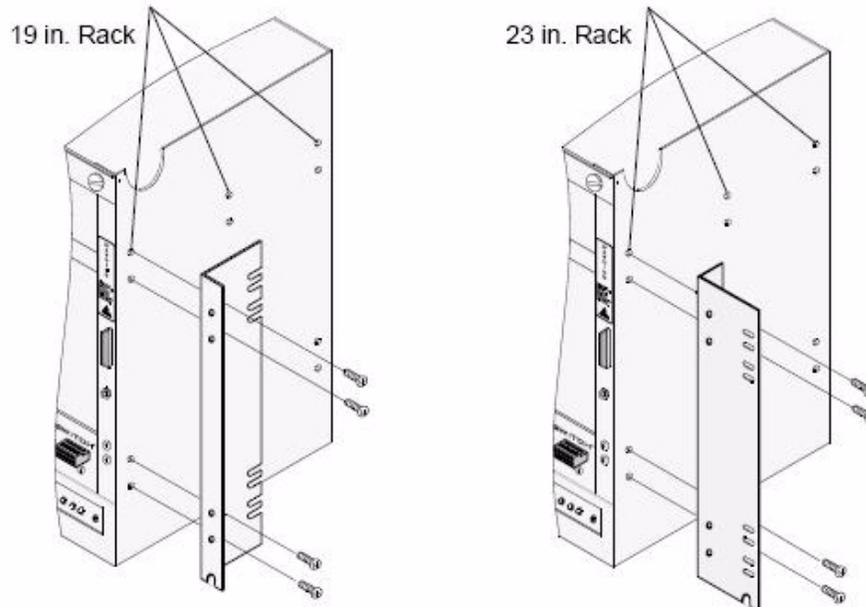
### Materials

- Wire for input power connections (14 AWG, copper conductor)
- Wire for optional external alarm devices (28 to 16 AWG)
- Wire for ground connection (14 AWG, copper conductor)
- Ground lugs for rack or other earth ground

## Step 1: Attach Mounting Flanges

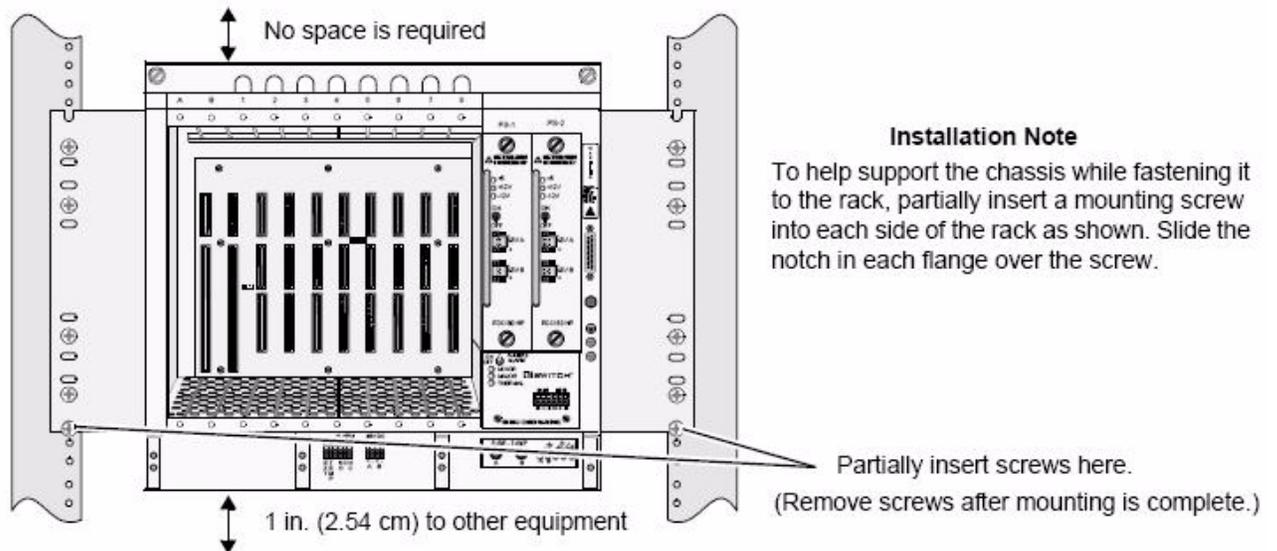
Attach the mounting flanges to fit a 19-inch or 23-inch rack. You can also attach the flanges in three locations providing multiple alignment options to the rack.

Install the mounting flanges in the desired location.



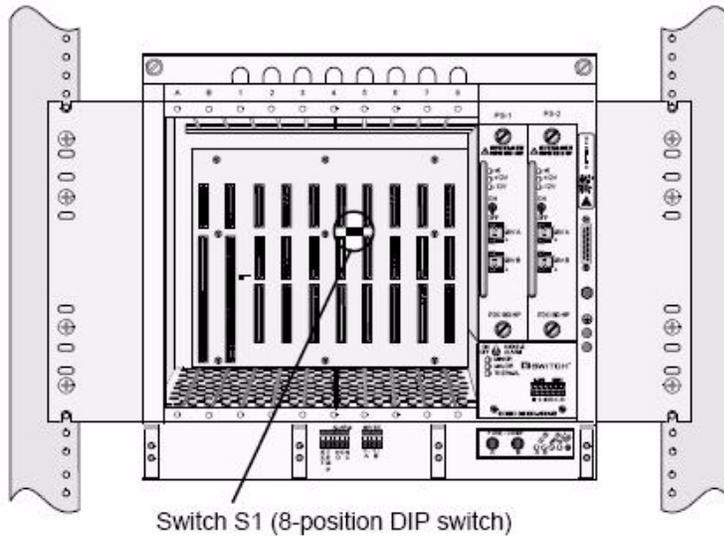
## Step 2: Attach AI180I to Rack

Install mounting screws into the mounting holes and tighten firmly.



## Step 3: Set IRB Option

Set the IRB for one bus or for two independent buses. By setting the switch, the IRB can be set for one bus or divided into two four-slot buses. The factory setting is one bus across all slots.



### Switches 1 to 8 ON

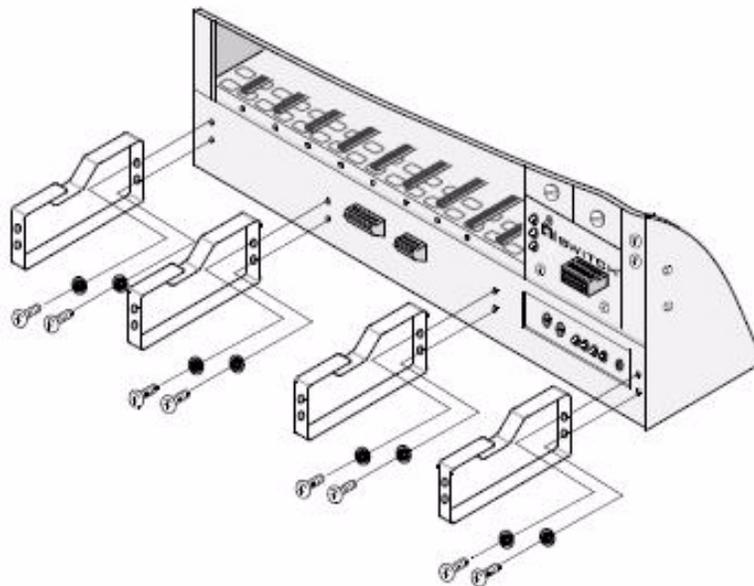
Sets the IRB across all slots. This is the factory setting.

### Switches 1 to 8 OFF

Divides the IRB into two four-slot IRBs. Slots 1 to 4 and 5 to 8 are independent. Both IRBs still have connections to slots A and B which house the AI198 common logic controller cards or the AI182-A bus repeater/expander cards.

## Step 4: Attach Cable Rings

Attach the cable rings to the chassis.



## Step 5: Attach Chassis Ground

Connect the chassis ground of AI180I to a suitable ground such as the frame ground of the rack system or to a reliable earth ground.

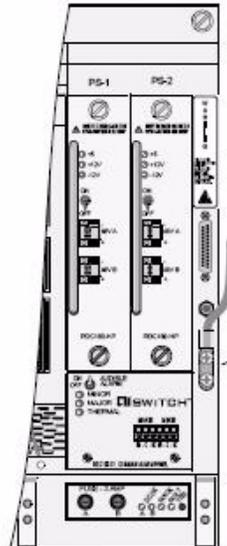
 **Caution:**

The chassis ground must be connected to the same earthing electrode conductor as the DC supply system or to a bonding jumper (from an earthing terminal or bus) connected to the earthing electrode of the DC supply system.

The chassis must be located in the same immediate area (such as adjacent cabinets) as other equipment connected to the same DC power system and earthing electrode conductor. The DC system cannot be earthed elsewhere.

The DC power source must be located in the same premises as the chassis.

No switching or disconnecting devices can be between the earthed conductor of the DC source and the earthing electrode conductor.



Ground Connection  
Use 14 AWG, copper  
conductor only.

**Note:** Apply an appropriate antioxidant to bare conductors before crimping connector and to connector mating surface.

## Step 6: Connect Input Power

 **Warning:** Turn off the feed power before connecting wires.

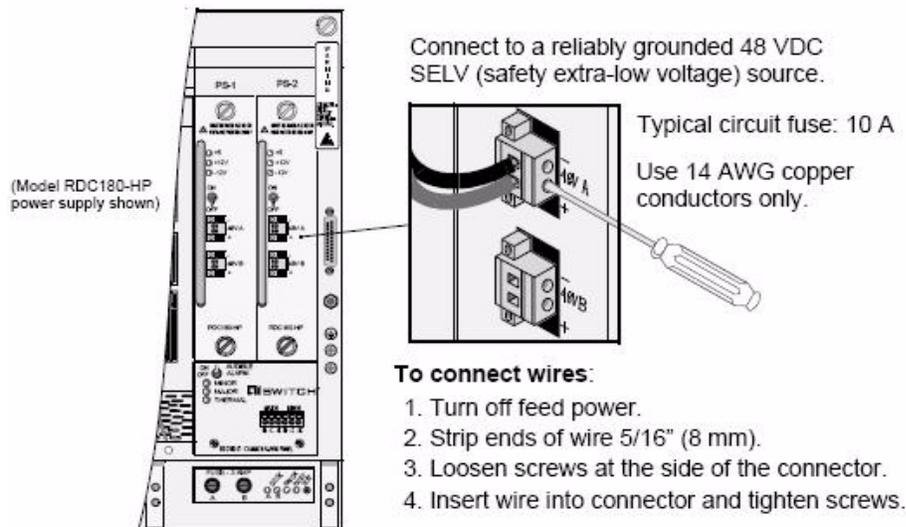
 **Caution:** For safety and to ensure proper cooling, cover all unused power supply slots with a blank cover (part number RDC180-BC).

Turn the power supplies off. Connect the input power feed to the power supply connector A. Be careful to observe polarity. If using a redundant input power feed, connect the other input power cable to connector B.

If using a redundant -48 DC power supply (RDC180-HP), connect the input power in the same manner as the first power supply.

If using only one -48 VDC power supply, it can be plugged into either power supply slot. For safety and for efficient cooling, cover the unused slot with a blank cover (part number RDC180-BC).

If using an AC power supply (AI325-AC), plug the furnished power cord into the connector on the power supply.



 **Caution:**

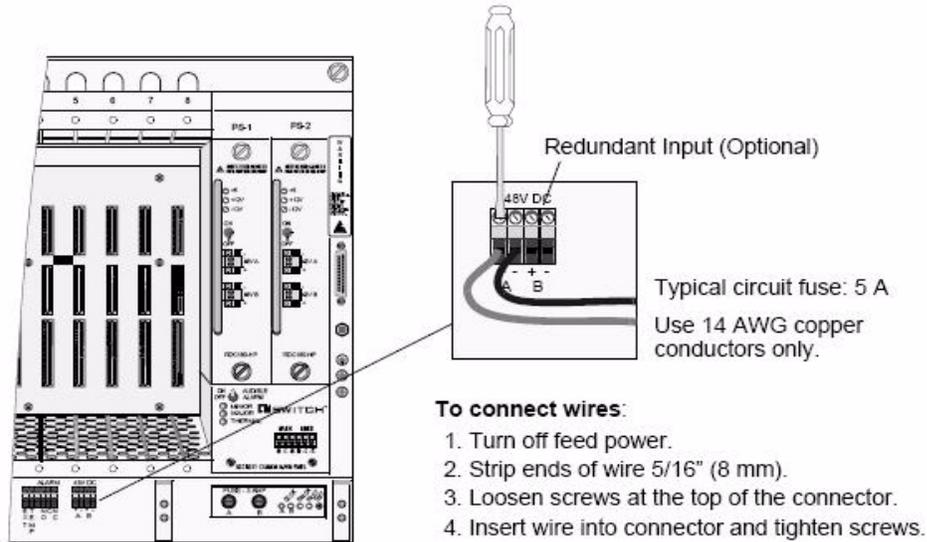
A readily accessible disconnect device (suitably approved and rated) must be incorporated in the field wiring.

The DC branch listed circuit breaker must be rated: 15 A, maximum at 48 V, minimum.

## Step 7: Connect Power to Alcool-48

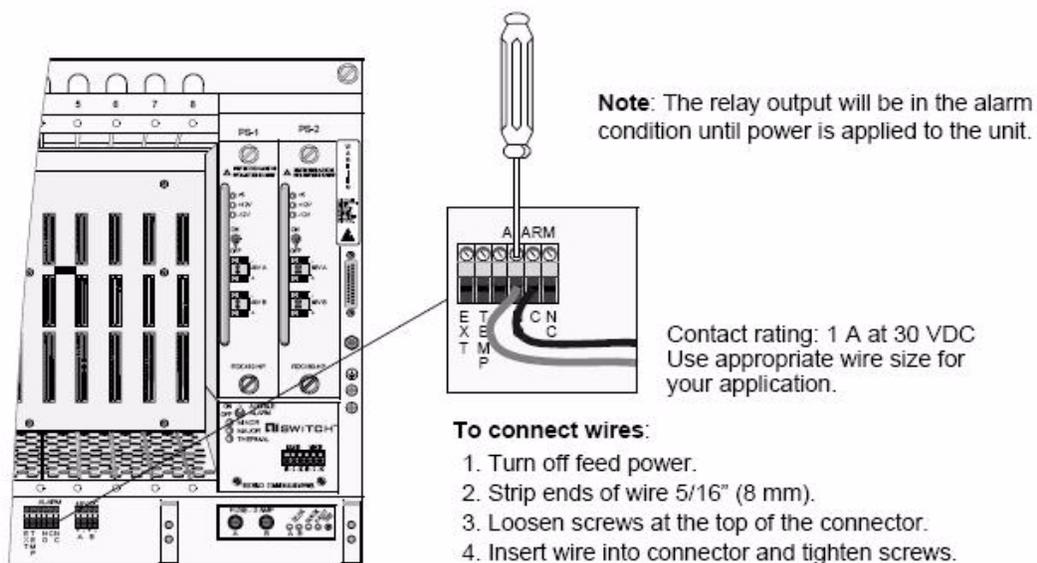
 **Warning:** Turn off feed power before connecting wires.

Connect 48 VDC input power to the 48 VDC connector terminals A+ A-. Be careful to observe polarity. If providing redundant power, connect the other input to the connector terminals B+ B-.



## Step 8: (Optional) Connect External Alarm Devices to Alcool-48

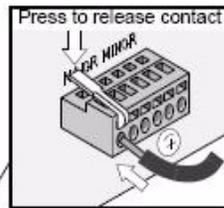
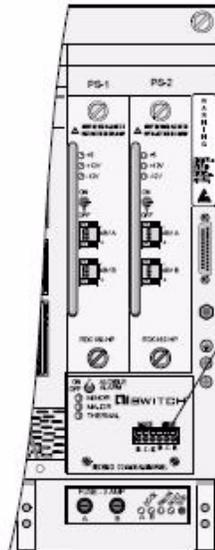
Connect the external alarm signaling device to the alarm relay contacts. These contacts activate if a fan fault occurs. The normally-opened or normally-closed outputs can be used to trigger external alarm devices.



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## Step 9: (Optional) Connect Common Alarm Panel

Connect external alarm signaling devices to the major and minor alarm relay contacts. These contacts provide normally-opened or normally-closed outputs that can be used to trigger external alarm devices.



**Note:** The relay output will be in the alarm condition until power is applied to the unit.

Contact rating: 2 A at 28 VDC  
Use appropriate wire size for your application.

### To connect wires:

1. Strip end of wire 5/16" (8 mm).
2. Press clip to open contact.
3. Insert wire and release clip.
4. Move clip to next contact by lifting back of clip away from connector.
5. Connect remaining wires.

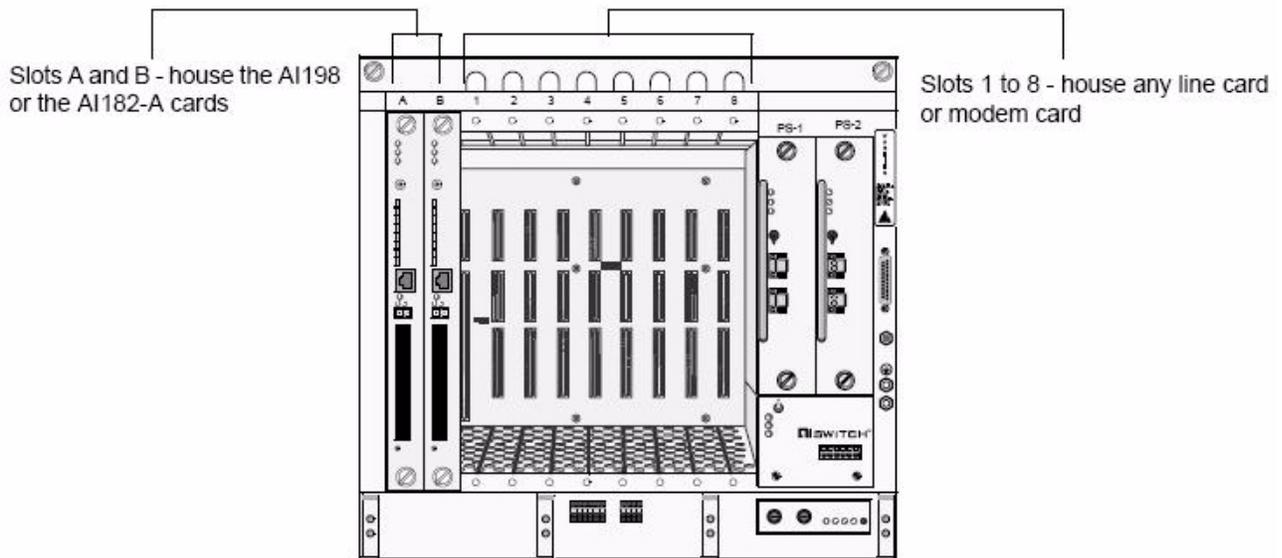
## Step 10: Install Line Cards



**CAUTION:** Installing a card into the wrong slot may damage the card. Personnel handling cards must wear an antistatic wrist strap and follow electrostatic procedures. For safety and to ensure proper cooling, cover all unused slots with a blank cover (part number AI180-BC).

Install the line cards into the chassis per your application. See the figure on the following page for slot assignments.

1. Position the card so the components face up.
2. Align the card with the card guides and slide the card into the chassis.
3. Firmly press the faceplate of the card until the internal connectors snap into place.
4. Tighten the two thumbscrews to secure the card to the chassis.



## Step 11: Turn On Power Supplies

Turn the power supplies on. The **+5V**, **+12V** and **-12V** indicators should illuminate green, indicating proper operation.

## Step 12: (Optional) Enter IP Address in AI198

Entering the IP address allows the AI180I system to be configured remotely. For complete configuration information, refer to the *AI198 Common Logic Controller System Manager/User's Guide*, part number 198UM.



**Note:** Not all cards can be remotely configured. Please refer to the user documentation for the specific card for complete configuration information.

1. Set the terminal emulation software on the PC/terminal emulator for 9600 baud, no parity, eight data bits, one stop bit, XON/XOFF flow control.
2. Using a terminal cable, connect the PC/terminal to the **CRAFT** port of AI180I. Press Enter.
3. At the login prompt, enter `ai` . This is the default login.
4. At the password prompt, enter `ai` . This is the default password.
5. At the prompt, enter `menu`. The Main Menu appears.



```
Main Menu
01+Configure options affecting the system as a whole
02+Create, delete, or modify a destination name
03+Display all destination names
04+Configure cards
05+Set or remove connection restrictions based on port numbers
```

6. At the prompt, enter 1. Menu 1 appears.

```
Menu 1
01+Set log and alarm thresholds
02*The display of connection information on user terminals is turned-----ON
03 The duration of a long break sequence in 1/64 seconds-----0000000120
04*The automatic baud rate detection system is turned-----ON
05*Printing of a destination name menu on user terminals is turned-----ON
06*Allow ports of different speeds to be connected (down speed)-----ON
07 The designator for this node is-----+--NODE-XXX
08*Allow dual CPUs to automatically switch if fault-----ON
09+AISwitch automatic commands
10*The display of destination names in four columns is turned-----ON
11*Automatic CLC update is-----ON
12+Network parameters
13+Time and Date format is hh:mm:ss mmddyy
14+SNMP Trap Table
```

7. At the prompt, enter 12. Menu 1.12 appears.

```
Menu 1.12
01 CLC IP address (0.0.0.1..255.255.255.254)-----0.0.0.1
02 CLC Router address (0.0.0.0..255.255.255.254)-----0.0.0.1
03 CLC Subnet mask (0.0.0.1..255.255.255.254)-----0.0.0.1
04 Telnet server port number (1..65535)-----00023
```

- a. At the prompt, enter 1 and the AI198 IP address. The new address appears.  
Example: 1, 123. 45. 678. 90
- b. At the prompt, enter 2 and the AI198 router address. The new address appears.
- c. At the prompt, enter 3 and the AI198 subnet mask. The new address appears.

- 
- 
- d. Save the configuration by entering 20 at each prompt until the Main Menu appears. Enter 21 to exit.

## Step 13: (Optional) Configure IP Address on a Line Card in Standalone Mode

Configuring the IP address on a line card in standalone mode allows the card to be accessed remotely. For complete configuration information, refer to the user documentation for the specific card.

### Connecting

1. Set the terminal emulation software on the PC/terminal emulator for 9600 baud, no parity, eight data bits, one stop bit, no flow control.
2. Using a terminal cable, connect the PC/terminal to asynchronous port 1 on AI296 or AI232, to the **CRAFT** port on Alfocus or Alwan, or to the **CONSOLE** port on Alconnect, Alextend, or Alfirewall. Press Enter.
3. At the login prompt, enter `ai` . This is the default login.
4. At the password prompt, enter `ai` . This is the default password.
5. Continue with the directions for the specific card (below).

### AI296, AI232, or Alwan

1. At the prompt, enter `ip init`.
2. Follow the on screen prompts to enter the IP address as well as a primary and backup router.



**Note:** The device must be reset before the changes take effect.

### Alfocus

To set the IP address:

- At the prompt, enter `set-ip` and the IP address.

Example: `set-ip 123.45.255.90`

To set the IP address and subnet mask:

- At the prompt, enter `set-ip-conf`, the IP address, and the subnet mask.

Example: `set-ip-conf 123.45.255.90 255.255.0.0`



**Note:** For changes to take effect, wait for the updated configuration stored message to appear and then reboot.

## Alconnect, Alextend, or Alfirewall

At the prompt, enter `config interface ethernet 0/`, the port being configured, `ip address`, the IP address, and the subnet mask.

Example: `config interface ethernet 0/2 ip address 123.45.255.90 255.255.0.0`



**Note:** The changes take effect as soon as you press Enter.

## Calculating Power Consumption and Heat Dissipation

The following procedure describes how to calculate power consumption and heat dissipation of AI180I. The output power of the power supplies is listed below.

- Model RDC180-HP: 250W at +5 VDC (applies to single and redundant power supply systems)
- Model AI325-AC: 200 W at +5 VDC



**CAUTION:** The power consumption of a chassis must not exceed the power supply output.

1. In the table below, fill in the quantity of cards used in the chassis. Multiply by the Watts per card to obtain a subtotal. Add the subtotals to obtain total card consumption. (A value for the chassis has been added to the table.)

Card	Watts per Card	Quantity	Subtotals
AI120 (4 maximum)	6.50	x _____	= _____ W
AI182-A	3.50	x _____	= _____ W
AI185	15.00	x _____	= _____ W
AI192	10.50	x _____	= _____ W
AI193 (all models)	14.00	x _____	= _____ W
AI194	12.50	x _____	= _____ W
AI198	13.00	x _____	= _____ W
AI196 (all models)	23.00	x _____	= _____ W
AI232	11.50	x _____	= _____ W
AI2524-55	18.60	x _____	= _____ W
AI2524-T4	12.00	x _____	= _____ W

Card	Watts per Card	Quantity	Subtotals
AI2524-T5	13.50	x _____	= _____ W
AI2524-TT	13.00	x _____	= _____ W
AI285/AI296	16.20	x _____	= _____ W
AI294-T	29.50	x _____	= _____ W
AI294-T/FL	39.50	x _____	= _____ W
Alconnect (one PMC)	17.00	x _____	= _____ W
Alconnect (two PMC)	24.50	x _____	= _____ W
AIE1	5.50	x _____	= _____ W
Alextend	9.50	x _____	= _____ W
Alfirewall	9.50	x _____	= _____ W
Alflex (all models)	27.00	x _____	= _____ W
Alwan T1/E1	6.00	x _____	= _____ W
Alfocus 32xx	13.00	x _____	= _____ W
Altc	15.00	x _____	= _____ W
Almodem 4/8	9.50	x _____	= _____ W
Chassis	15.00	_____ 1	= <u>15.00</u> W
<b>Total Card Consumption</b>			<b>= _____ W</b>

2. Calculate the total power draw. In the table below, enter the Total Card Consumption obtained in step 1. Then multiply by the typical power supply loss factor at full load to obtain the total power draw in Watts.

Chassis Watts	Power Supply Loss Factor	Total Power Draw
1. Total Card Consumption (from Table 1) _____ W	x 1.19	= _____ W

3. Calculate the total chassis heat dissipation. In the table below, enter the values obtained in steps 1 and 2 and find their total in Watts. Then multiply the Total Chassis Power Consumption (Watts) by the factor 3.41 to convert to Btu/Hr.

1. Total Power Draw (from Table 2)	_____ W
2. Alcool (fan tray)	+ <u>36.50</u> W
<b>3. Total Chassis Power Consumption (Watts)</b>	<b>= _____ W</b>

4.	Multiply by 3.41
5. <b>Total Chassis Heat Dissipation</b>	= _____ <b>Btu/Hr</b>

### Calculating Current Draw

Use these procedures to calculate the actual current that AI180I draws from the DC or AC power source. Calculations are based on the Total Chassis Power Consumption (Watts), a value developed in the previous section. For multi-chassis systems, perform the calculation for each chassis and then sum the chassis totals to find the total system current. This total current is used by the site engineer to determine power plant capacity requirements.

#### Calculating Actual DC Current Draw

To find the actual DC current draw of AI180I:

1. Total Chassis Power Consumption (Watts) from (Table 3, line 3)	_____ W
2. Divide by the actual DC voltage at the site	= _____ Actual Current

#### Calculating Actual AC Current Draw

To find the actual AC current draw of AI180I:

1. Total Card Consumption from (Table 1)	_____ W
2. Alcool (fan tray)	+ <u>36.50</u> W
3.	= _____ W
4. Divide by the power factor 0.60 (see note)	= _____ VA
5. Divide by the actual AC voltage at the site	= _____ Actual Current

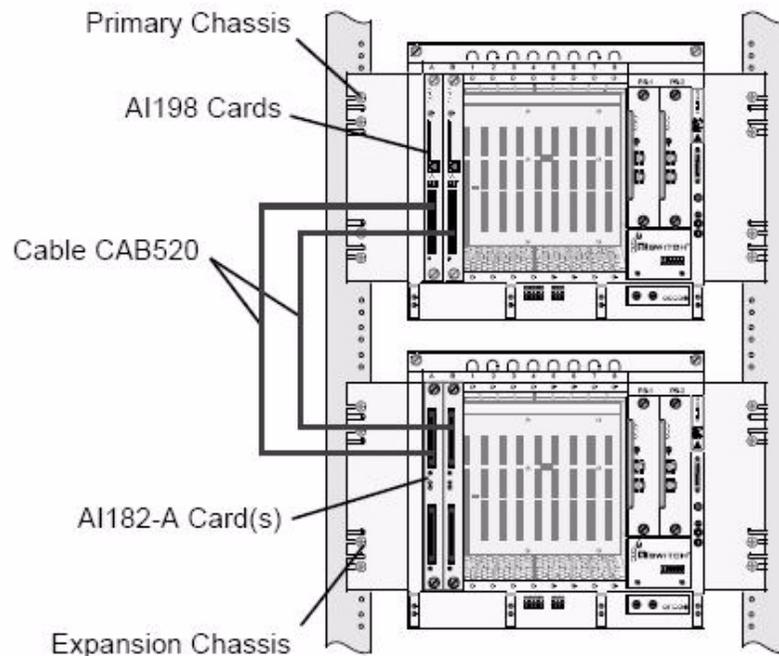
 **Note:** Alcool (fan tray) requires an additional external AC - DC converter. For this calculation, a power factor of 0.60 is assumed for this additional power supply.

### Connecting Two Chassis

Two AI180I chassis can be connected together to obtain additional mounting slots for line cards. This feature allows two chassis to share the same AI198 (two AI198 cards if providing redundancy). In this arrangement, the first chassis contains the AI198

card(s) and the second chassis contains an AI182-A card(s). The AI198 card(s) and the AI182-A card(s) are then cabled together.

1. Install both chassis.
2. In the first (primary) chassis, insert the AI198 into slot A. If using a redundant AI198, insert it into slot B.
3. In the second (expansion) chassis, insert the AI182-A into slot A. If using a redundant AI198 in the primary chassis, insert another AI182-A into slot B of the expansion chassis.
4. Connect the two chassis together using cable CAB520. Attach one end of the cable to the **BUS OUT** connector on the AI198 in slot A. Attach the other end of the cable to the **BUS IN** connector on the AI182-A in slot A. If using a redundant AI198, repeat this step for the AI198 and AI182-A cards in slot B of the chassis.



## Technical Specifications

Specification	Description
Card Slots	10 slots - supports up to two AI198 or two AI182-A cards and up to eight line cards
Weight	30 lb (13.5 kg) approximately, fully loaded
Size	Height: 15.84 in. (40.23 cm) Width: 16.81 in. (42.69 cm) Depth: 9.93 in. (25.22 cm)
Mounting	Mounts in a standard 19-inch or 23-inch rack (includes mounting flanges)
Clearance Requirements	Above the chassis: No clearance required Below the chassis: 1 in. (2.54 cm) to other equipment
Operating Environment (Ambient)	Temperature: 41° to 104°F (5° to 40°C) Relative Humidity: 5% to 85%
Power Supplies	AI180I can use either of the following power supplies:  RDC180-HP Power Supply (may use two): Input Voltage: -48 VDC, nominal (Range: -42.5 to -57.5 VDC) Input Current: 7.1 A, maximum at 48 VDC; 8.5 A, maximum at 40 VDC  AI325-AC Power Supply: Input Voltage: 120/240 VAC, nominal (Range: 102 to 264 VAC) Frequency: 50/60 Hz, nominal (Range: 47 to 63 Hz) Input Current: 7 A, maximum at 102 VAC
Circuit Fuse (power supply)	10 A, typical, external fused supply
Circuit Fuse (fan assembly)	5 A, typical, external fused supply
Fan Fuses (A and B)	3 A (on front panel of unit)
Relay Contact Rating	RDC180-CI Common Alarm Panel: 2 A at 28 VDC Alcool-48: 1 A at 30 VDC
Compliance and Certification	Meets Telcordia Network Element Building Standards (NEBS) Level 3 functionality
Safety	Equipment for use in a restricted access location only

