digital

861-A, -B, -C, -D, -E, -F power controller user's manual

digital equipment corporation · maynard, massachusetts

861-A, -B, -C, -D, -E, -F
power controller
user's manual

EK-861AB-OP-001

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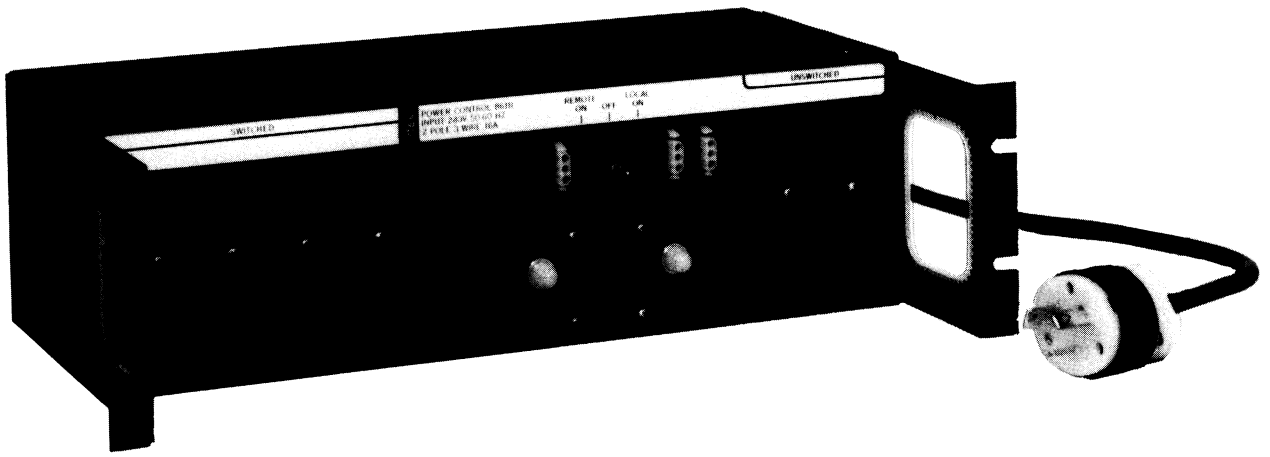

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CHAPTER 1
INTRODUCTION

This manual provides information for installing and operating the 861-A, 861-B, 861-C, 861-D, 861-E, and 861-F Power Controllers, designed and manufactured by Digital Equipment Corporation.

1.1 GENERAL DESCRIPTION

The 861 Power Controllers provide a means for controlling and distributing power to data processing equipment.

All versions are contained on panels intended for mounting in racks or cabinets that accept standard 19-inch panels. Each power controller requires 5-3/16 inches of vertical mounting space. The 861-A,-B,-C,-F extends 8-1/4 inches into the mounting rack or cabinet and the 861-D,-E extends 11 inches into the mounting rack or cabinet.

The following versions are available to provide for a variety of input power configurations:

Figures 1-1 and 1-2 are simplified block diagrams of the 861 Power Controllers. Four basic functions are performed:

a. Control of large amounts of power by control signals of small power content.

b. Convenient distribution of primary power to controlled devices.

c. Filtering of primary power to controlled devices.

d. Automatic removal of primary power from controlled devices in case of overload or overtemperature conditions.

1.2 SPECIFICATIONS

The following specifications are included here for reference purposes only and are subject to change without notice.

Version	Voltage	Hertz	Phase
861-A	90-135	47-63	Two (120° or 180° displaced)
861-B	180-270	47-63	Single
861-C	90-135	47-63	Single
861-D	90-132	47-63	Three (120° displaced)
861-E	180-264	47-63	Three (120° displaced)
861-F	90-135	47-63	Single

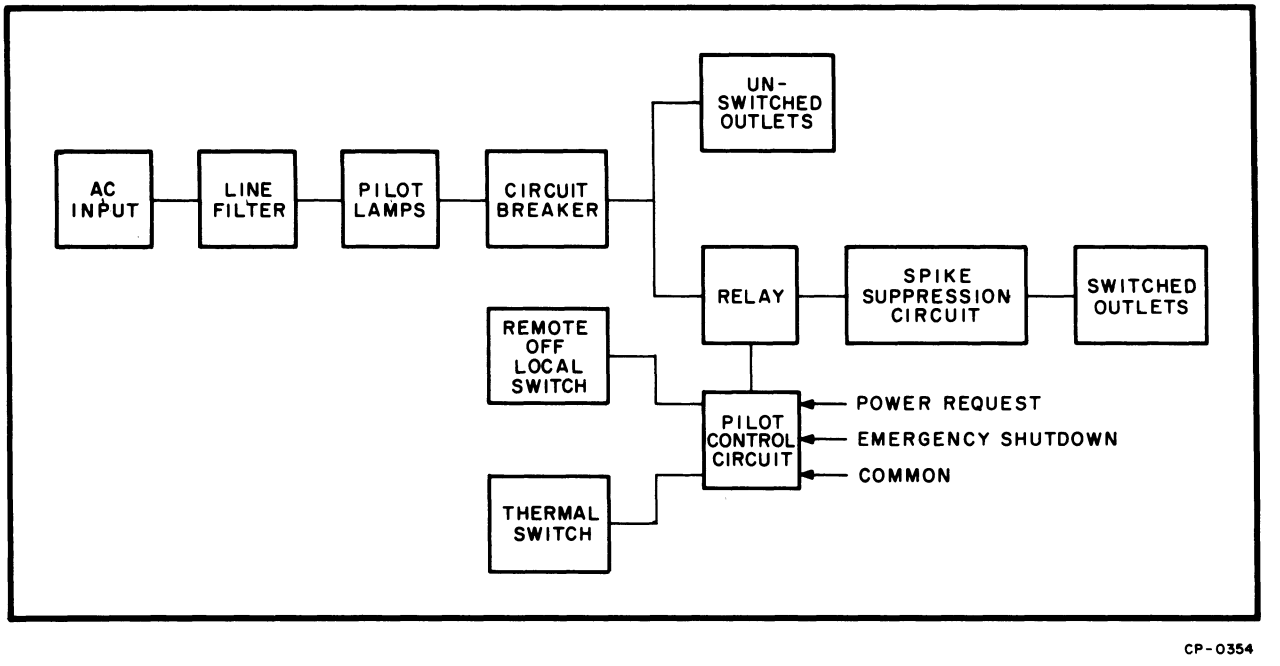


Figure 1-1 Simplified Block Diagram - 861-A,-B,-C,-F

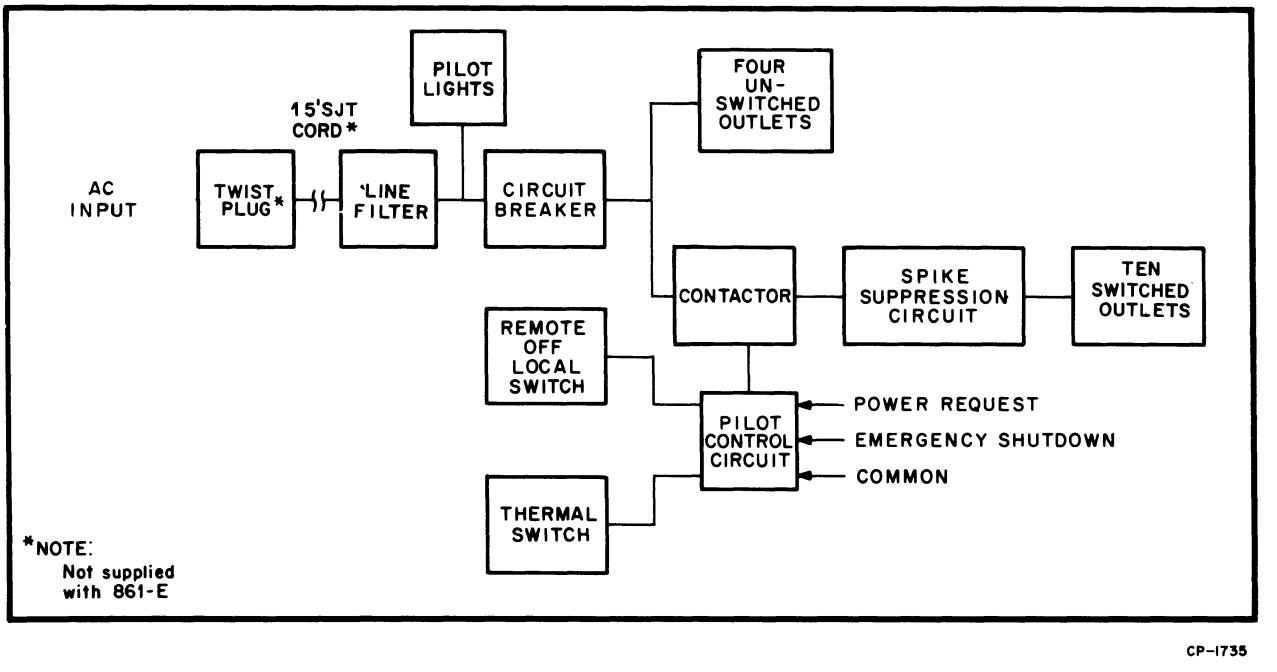


Figure 1-2 Simplified Block Diagram - 861-D,-E

1.2.1 Mechanical And Environmental

Dimensions

861-A,-B,-C,-F: 5 in. h x 19-1/8 in. w x 8 in. d (12.7 cm h x 48.5 cm w x 20.3 cm d)

861-D,-E,: 5 in. h x 19-1/8 in. w x 11 in. d (12.7 cm h x 48.5 cm w x 27.9 cm d)

Weight

861-A,-B,-C,-F: 10 lb (4.54 kg) (approx)
861-D,-E: 27 lb (12.26 kg) (approx)

Cooling Method

Convection

Mounting

Rack (standard 19 in.)

Ambient Temperature

Operating

861-A,-B,-C,-F: 0° to +60° C

861-D,-E: 0° to +70° C

Storage

-40° to 71° C

Relative Humidity

95% max (no condensation)

Altitude

861-A,-B,-C,-F: 10,000 ft (max)
861-D,-E: 8000 ft (max)

1.2.2 Electrical

Input Power

Voltage

861-A,-C,-F: 90 Vac - 135 Vac; 861-B: 180 Vac - 270 Vac; 861-D: 90 Vac - 132 Vac; 861-E: 180 Vac - 264 Vac

Phase

861-A: Two (120° or 180° displaced); 861-B,-C,-F: Single; 861-D,-E: Three (120° displaced)

Frequency

47 Hz - 63 Hz

Current

861-A: 16A per pole; 861-B: 16A per pole; 861-C: 24A per pole; 861-D: 24A per pole; 861-E: 15A per pole; 861-F: 12A per pole.

Power Requirements

Full Load

861-A: 3830 VA; 861-B: 3830 VA; 861-C: 2870 VA; 861-D: 8640 VA; 861-E: 10,800 VA; 861-F: 1435 VA

No Load

861-A,-B,-C,-D,-E,-F: 10 VA

Inrush Current Capability

240 A peak, 1 cycle

Leakage Current

861-D: 1.75 mA max. 861-E: 3.5 mA max.

Input Overvoltage Transient

180/360 V, 1 sec (power controller alone)

Activate Time

20 ms (from switch closing to power out)

Deactivate Time

10 ms (from switch opening to power out)

Input Breaker

861-A,-B,-C: 20 A delayed action, manual reset, magnetic
861-D: 30 A delayed action, manual reset, magnetic
861-E: 15 A delayed action, manual reset, magnetic
861-F: 10 A delayed action, manual reset, magnetic

Thermoswitch

Opens at 160°F, automatically resets at 120° F, 49° C (exposed to ambient air external to controller)

Input Power Connector

861-A: 4-prong twist plug, NEMA* L14-20P; 861-B: 3-prong twist plug NEMA L6-20P; 861-C: 3-prong twist plug NEMA L5-30P; 861-D: 5-prong twist plug, NEMA L21-30P; 861-E: pressure fit terminal block; 861-F: 3-prong standard plug NEMA L5-15P.

Hipot

2.1 kVdc for 60 sec (input and output to chassis).

Remote Switching Control Connectors

3 each: Female, AMP 1-480304-0 (DEC-12 09350-03) with AMP 61117-4 (DEC-12-09379) pins or equivalent that mate with AMP 1-480305-0 (DEC-12-09351) with AMP 61118-4 (DEC-12-09378) pins or equivalent

Input Signal Current Levels

861-A,-B,-C,-F: 0.5 mA (min), 10 mA (max); 861-D,-E: 0.5 mA (min), 40 mA (max) load worst case to each bus signal line when connected to pin 3.

Input Signal Voltage Levels

861-A,-B,-C,-F: 3.0 V max = low; +35 V min = high (open circuit = high); 861-D,-E: +3.0 V max = low; +32 V min = high. Worst case to each bus signal line in relation to pin 3.

Bus Signal Line Overload Capability

125 Vac rms @ 60 Hz, 13 kΩ impedance in relation to pin 3 for two seconds with no damage

Power Control Impedance

Inductive (diode suppressed)

Capacitance

200 pF (max)

Output (861-A,-B,-C,-F)

Outlets (power)

Twelve (8 switched, 4 unswitched)

Outlet Current Ratings

861-A: 12 A per outlet, 16 A per branch circuit; 32 A total; 861-B: 12 A per outlet, 16 A total; 861-C: 12 A per outlet, 16 A per branch circuit, 24 A total; 861-F: 6 A per outlet, 8 A per branch circuit, 12 A total.

Outlet Inrush Current

861-A: 240 A peak per branch circuit (1 cycle), 480 A peak total (1 cycle); 861-B: 240 A peak total (1 cycle); 861-C: 240 A peak per branch circuit (1 cycle), 360 A peak total (1 cycle); 861-F: 120 A peak per branch circuit (1 cycle), 180 A peak total (1 cycle).

Output (861-D,-E)

Outlets (power)

Fourteen (10 switched, 4 unswitched)

Outlet Current Ratings

861-D: 15 A per outlet, 24 A per phase, 72 A total; 861-E: 12 A per outlet, 15 A per phase, 45 A total.

Outlet Inrush Current

240 A peak per branch circuit (1 cycle)

All provisions of Underwriters Laboratories Specification UL-478 have been met in the design and manufacture of the 861-A, 861-B, 861-C, 861-D, 861-E and 861-F Power Controllers.

*National Electrical Manufacturer's Association

CHAPTER 2
INSTALLATION

2.1 SITE CONSIDERATIONS

The dimensions of the 861-A,-B,-C, and -F Power Controllers are identical. Each is contained on a 19-inch panel intended for mounting on a rack or in a cabinet that accepts standard 19-inch panels. Each power controller requires 5-1/4 inches of vertical mounting space and extends approximately 8 inches into the mounting rack or cabinet. For convenience, the power controller should be mounted as close as feasible to the units it controls.

The dimensions of the 861-D and -E Power Controllers are identical. Each is contained on a 19-inch panel intended for mounting on a rack or in a cabinet that accepts standard 19-inch panels. Each power controller requires 5-1/4 inches of vertical mounting space and extends approximately 11 inches into the mounting rack or cabinet. For convenience, the power controller should be mounted as close as feasible to the units it controls.

Ambient temperature at the installation site should not exceed +60°C; for the 861-A,-B,-C,-F or +70° C for the 861-D,-E; relative humidity should remain below 95 percent, with no condensation. For other environmental particulars, refer to Paragraph 1.2.

2.2 CABLES

Each power controller requires the following cables:

a. Input Power (provided with 861-A,-B,-C,-D,-F only)

b. Remote Switching Control, DEC No. 70-08288, 70-10695, or equivalent (not provided)

c. Output Power (provided with controlled units)

These cable assemblies are described in the following paragraphs.

2.2.1 Input Power

The type of input power cable depends on which version of the power controller is being installed. Table 2-1 describes the input power cables. Cables supplied are 15 feet in length and are composed of insulated stranded conductors. (Cables with a grounded shield braid are recommended for EMI/RFI protection.)

The power cable connector types provided also differ depending upon which 861 version is being installed. Table 2-2 lists the plug and receptacle types with NEMA and DEC designations. Figure 2-1 shows the power connector outlines and provides color coding information.

The input power cable connects to the 4-terminal block at the side of the line filter. In 861-A installations, the following connections must be made:

a. Green - N (Earth Ground)
b. Black - C (Phase 2)
c. White - B (Neutral)
d. Red - A (Phase 1)

In 861-B installations the following connections must be made:

a. Green - N (Earth Ground)
b. White - B (Phase or Neutral)
c. Black - C (Phase or Neutral)
d. No Connection - A

Table 2-1
Input Power Cables

Controller	Conductors	Size	Coding
861-A	4	#12 AWG	Green, black, white, red
861-B	3	#14 AWG	Green, black, white
861-C	3	#12 AWG	Green, black, white
861-D	5	#10 AWG	Green/yellow, black, white, red, orange
861-E	5	#14 AWG (Shielded)	Green/Yellow, black, black, brown, blue (not provided)
861-F	3	#14 AWG	Green, black, white

Table 2-2
Input Power Cable Connectors

		NEMA No.	DEC No.
861-A	4-Prong Twist Plug	L14-20P	12-11045
	4-Prong Twist Receptacle	L14-20R	12-11046
861-B	3-Prong Twist Plug	L6-20P	12-11192
	3-Prong Twist Receptacle	L6-20R	12-11191
861-C	3-Prong Twist Plug	L5-30P	12-11193
	3-Prong Twist Receptacle	L5-30R	12-11194
861-D	5-Prong Twist Plug	L21-30P	12-12314
	5-Prong Twist Receptacle	L21-30R	12-12315
861-E	(Not provided)		
861-F	3-Prong Plug	L5-15P	90-08938
	3-Prong Receptacle	L5-15R	12-05351

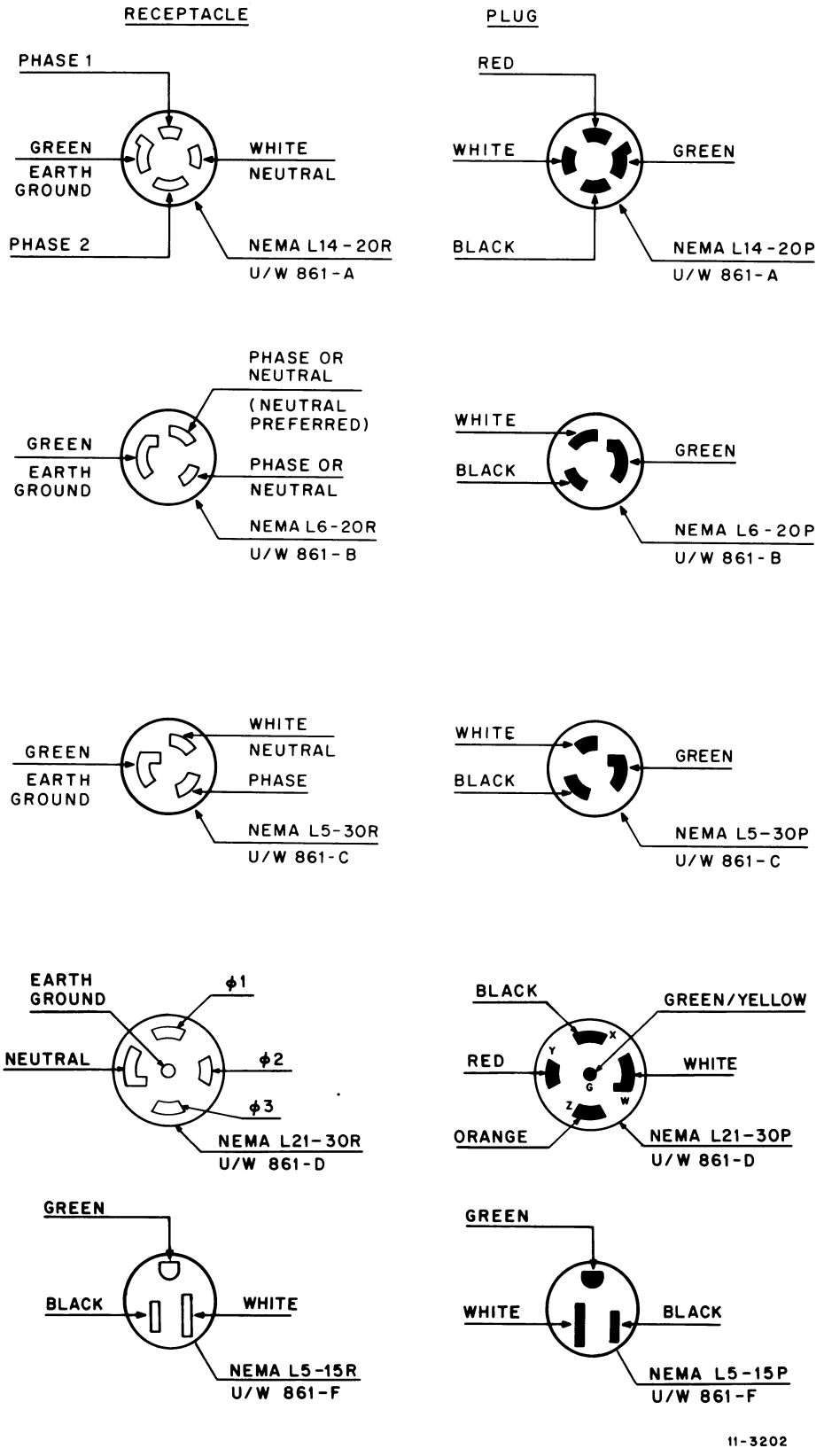


Figure 2-1 Connector Wiring

In 861-C,-F installations, the following connections must be made:

a. Green - N (Earth Ground)
b. White - A (Neutral)
c. Black - B (Phase)

In 861-D installations, the following connections must be made:

a. Green/yellow - N (Earth Ground)
b. Black - (Phase 1)
c. White - (Neutral)
d. Red - (Phase 2)
e. Orange - (Phase 3)

NOTE

The 861-E Power Controller is not supplied with an ac power cord and connector. It is shipped with a strain relief installed. Local electrical codes should be referenced for the size and type of power cord and connector used.

2.2.2 Remote Switching Control

Three female bus connectors, wired in parallel, are provided on the front panel for accepting and re-routing the Remote Switching Control Bus. Each is an AMP Mate-N-Lok type AMP 1-480304-0 (DEC-12-0-350-3) with AMP G117-4 (DEC-12-09379) pins or equivalent.

Connections between units are effected with from one to three cable assemblies of 3-conductor stranded #22 AWG cable terminated at each end with male connectors. These are AMP 1-480305 (DEC-12-09351) with AMP 61118-4 (DEC-12-09378) pins or equivalent. Cable assembly details are shown on drawing DEC-70-08288. Color coding is as follows:

a. Pin 1 - Red
b. Pin 2 - Black
c. Pin 3 - Green

Remote Switching Control Bus lines connect the Signal Return, Power Request, and Emergency Shutdown lines from the processor and system devices to the power controller in systems employing compatible automatic control features. These lines are low for assertion. Figure 2-2 shows one female connector viewed from the front.

2.2.3 Output Power

Power for the 861-A,-B,-C,-F is provided to controlled units from the 12 convenience outlets (8 switched, 4 unswitched). Power cables must be terminated with standard 3-prong male connectors (NEMA 5-15P for the 861-A,-C,-F and NEMA 6-15P for 861-B) to mate with the female connectors (NEMA 5-15R for the 861-A,-C,-F and NEMA 6-15R for 861-B) on the panel.

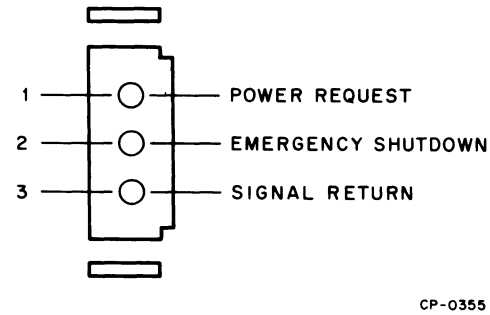


Figure 2-2 Signal Bus Connector

Power for the 861-D,-E is provided to controlled units from the 14 convenience outlets (10 switched, 4 unswitched). Power cables must be terminated with standard 3-prong male connectors (NEMA5-15P or 5-20P for the 861-D and NEMA 6-15P for the 861-E) to mate with the female connectors (NEMA 5-15R or 5-20R for the 861-D and NEMA 6-15R for the 861-E) on the panel.

2.3 GROUNDING

A good return ground is essential to proper power controller operation. A secure electrical connection must exist between the controller and the frame of the associated rack or cabinet. To accomplish this, (861-A,-B,-C,-F) use a 10-32 nut with serrated washer and a 10-32 bolt with serrated washer in at least one of the four mounting holes. For the 861-D,-E, use a serrated washer and a 10-32 bolt with serrated washer in a 10-32 press nut on the rear of the controller.

2.4 INITIAL OPERATION

Before applying primary power to the power controller, determine that the power at the mains is of the correct value for the particular 861 version being installed and that all cables are connected correctly.

NOTE

If the controller is being installed in a system where the Emergency Shutdown and Power Request lines are not in use, the LOCAL/OFF/REMOTE switch must be in the LOCAL position.

In systems where the Emergency Shutdown and Power Request lines (or their equivalents) are to be used, provisions must exist for connecting pin 1 to pin 3 when normal operation is desired (power is supplied to the controlled devices through the switched outlets). Provision must also exist for connecting pin 3 to pin 2 if an Emergency Shutdown feature is to be implemented.

Once it has been determined that correct power exists at the mains and that all cabling is correct, and before connecting any devices to the power outlets, connect the controller power plug to the appropriate receptacle. All pilot lamps on the panel should light. The circuit breaker(s) on the panel should be thrown to the ON position and the LOCAL/OFF/REMOTE switch to the LOCAL position. Measure the voltage at the switched and unswitched outlets. If the measured values are correct for the power controller in use, the power controller should be shut down, the loads connected to the switched and unswitched outlets*, and the circuit breaker(s) thrown ON again. The system should now operate. If the circuit breaker trips, or other abnormality exists, refer to the maintenance information in Chapter 5 of the *861-A-F Power Controller Maintenance Manual.*

If the Emergency Shutdown feature is in use, check that the power controller responds properly to shutdown requests from each external device.

Also, if required, the operation of the thermally-activated overtemperature switch can be checked by holding a match in proximity to the sensing element and observing that the switched outlets are disabled. The thermal switch should reset automatically after a brief period, once the flame is removed.

*Loads should be balanced between circuits.

CHAPTER 3
OPERATION

3.1 CONTROLS AND INDICATORS

Figure 3-1 shows the front panels for the 861-A, 861-B and 861-C Power Controllers. Each version has two pilot lamps, a circuit breaker, a 3-position toggle switch, and several power outlets. Their functions are discussed in the following paragraphs.

Figure 3-2 shows the front and back panels for the 861-D and 861-E Power Controllers. Each version has three pilot lamps, a main circuit breaker, a 3-position toggle switch, and several power outlets. In addition, the 861-D has six branch circuit breakers. Their functions are discussed in the following paragraphs.

Figure 3-3 shows the front panel for the 861-F Power Controller. Controls, indicators and outlets are the same as for the 861-C.

3.1.1 Pilot Lamps

In all 861 Power Controller versions, all pilot lamps are lighted whenever the controller input power cable is connected to the live mains, regardless of the position of the power controller circuit breaker or LOCAL/OFF/REMOTE switch.

3.1.2 Circuit Breaker

Circuit breaker CB1, when ON, provides power to the unswitched outlets, and to the switched outlets when the LOCAL/OFF/REMOTE switch is in the LOCAL position (or in the REMOTE position and a connection exists between pins 1 and 3 of a Remote Switching Control Bus connector*). The circuit breaker opens automatically when an overload condition exists at a power outlet or within the power controller.

*A connection between pins 2 and 3 of the Remote Switching Control Bus disables the switched outlets, regardless of the position of the LOCAL/OFF/REMOTE switch.

The following are the outlet current ratings:

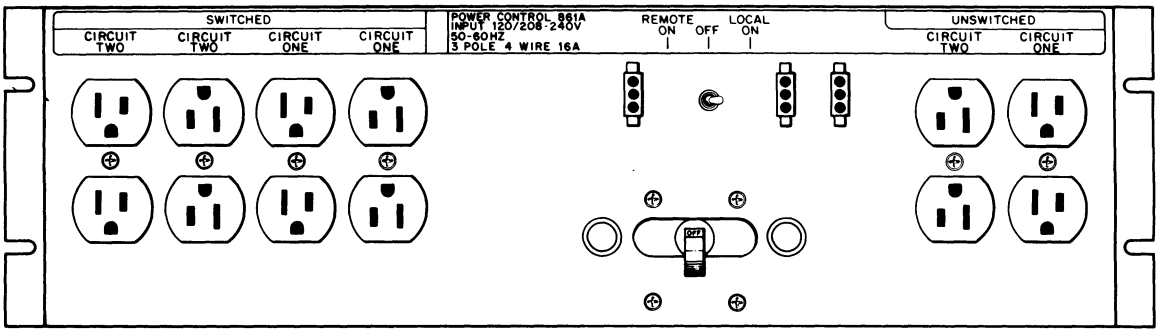
Version	Per Outlet	Per Branch/Phase	Total
681-A	12A	16A	32A
681-B	12A	16A	16A
861-C	12A	16A	24A
861-D	15A	24A	72A
861-E	12A	15A	45A
861-F	6A	8A	12A

3.1.3 LOCAL/OFF/REMOTE Switch

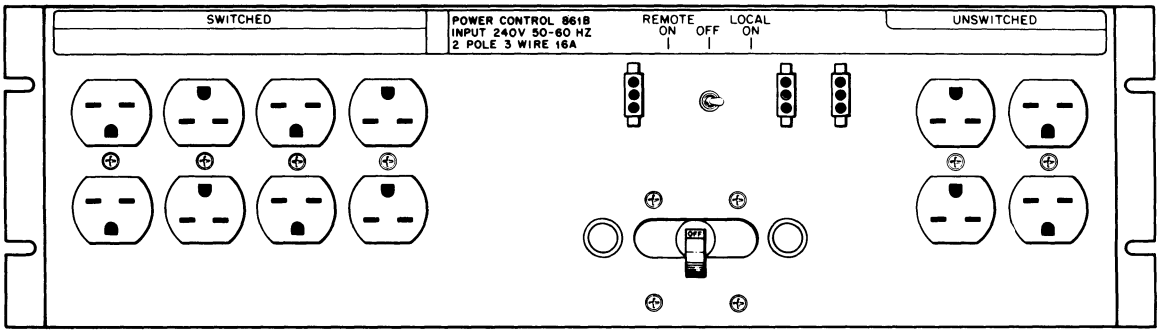
The LOCAL/OFF/REMOTE switch provides the Remote Switching Bus with the means to control the power to the switched outlets. When the power controller is energized and the switch is in the OFF position, the switched outlets are disabled. When in the REMOTE position and connected to a bus where Power Request and Emergency Shutdown are in use (or a means of effecting connection between pin 3 and pins 1 or 2 exists), the switched outlets are enabled or disabled in accordance with conditions on the bus. When in the LOCAL position, the switched outlets are enabled only when the Emergency Shutdown signal is not asserted.

3.1.4 Remote Switching Control Bus Connectors

The three female Signal Bus connectors, adjacent to the LOCAL/OFF/REMOTE switch, are wired in parallel. These connectors provide a means of daisy-chaining the Remote Switching Control Bus between the controller and system devices.



861-A



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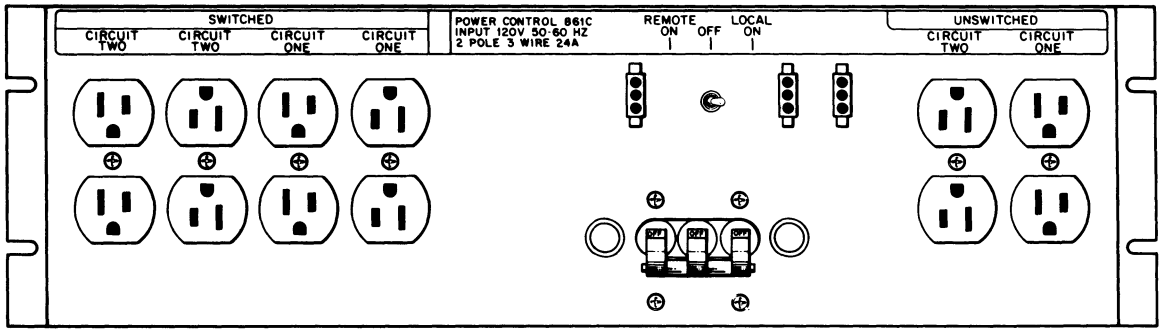
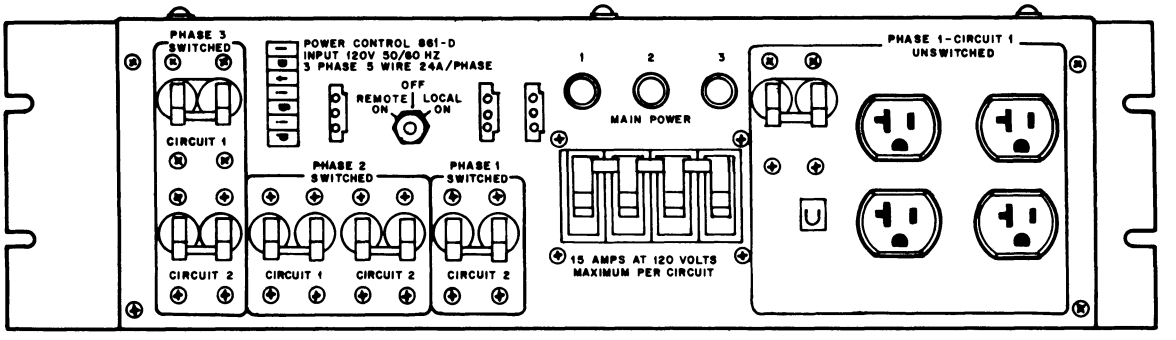
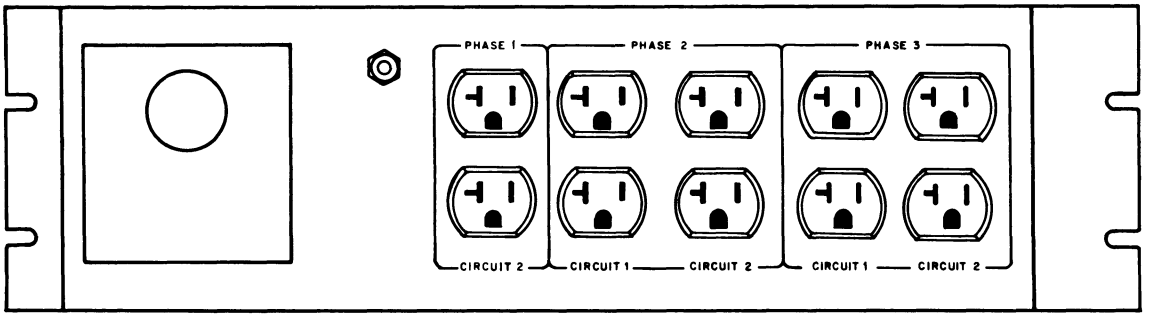


861-C

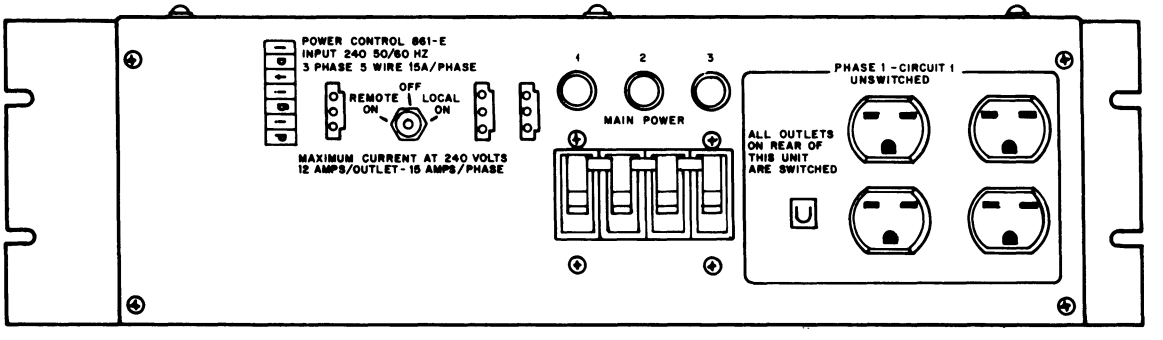
Figure 3-1 Type 861-A,-B,-C Power Controller Panels



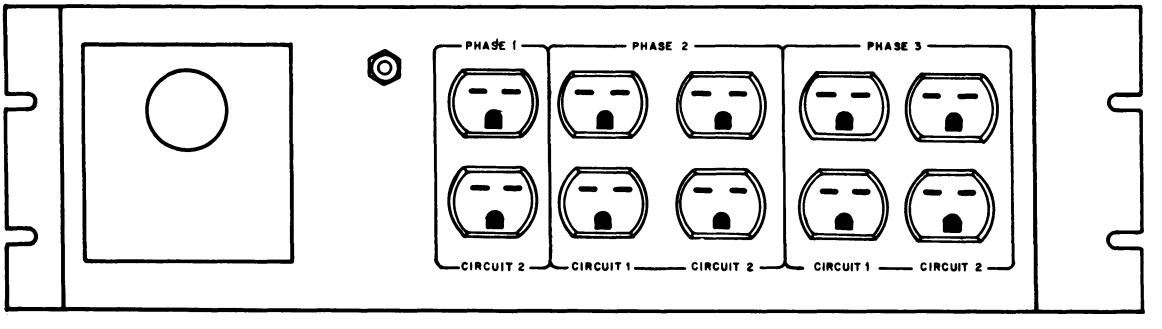
861-D (Front Panel)



861-D (Back Panel)



861-E (Front Panel)



CP-1730

861-E (Back Panel)

Figure 3-2 Type 861-D,-E Power Controller Panels

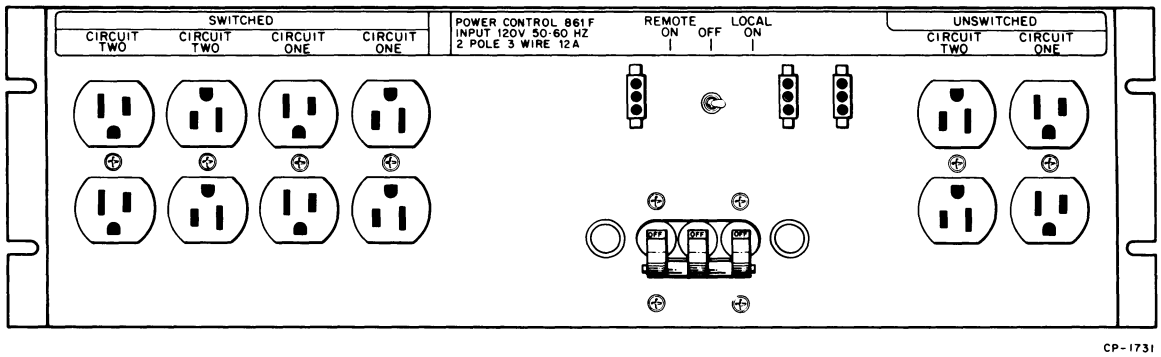


Figure 3-3 Type 861-F Power Controller Panel

3.1.5 Power Outlets

Two groups of power outlets are provided on the panel. The group containing eight (861-A,-B,-C,-F) or ten (861-D,-E) receptacles is the switched group. Under normal conditions, power is available at these outlets when the LOCAL/OFF/REMOTE switch is in the LOCAL position, or when in the REMOTE position and a connection exists between pins 1 and 3 of the Remote Switching Control Bus connector. Power is removed from these outlets by any of the following:

a. Main circuit breaker in OFF position, (or branch circuit breakers OFF if 861-D.)

b. LOCAL/OFF/REMOTE switch in the OFF position.

c. LOCAL/OFF/REMOTE switch in the REMOTE position and no connection exists between the lines associated with pins 1 and 3 of the Remote Switching Control Bus Connectors.

d. LOCAL/OFF/REMOTE switch in the REMOTE or LOCAL position and a connection exists between the lines associated with pins 3 and 2 of the Remote Switching Control Bus connectors (Emergency Shutdown signal asserted).

e. Overtemperature switch closed.

The group containing four power outlets is not controlled by the Remote Switching Control Bus. Power is available at these outlets when the main circuit breaker is closed and the power controller is connected to the live mains. (861-D: branch circuit breaker also closed.)

3.1.6 Overtemperature Switch

A thermally-activated switch is provided to disable the controlled outlets in the event of an overtemperature condition at the power controller. The switch opens at 160° F and resets automatically when the ambient temperature at the power controller drops below 120° F.

Reader's Comments

861-A, B, C, D, E, F POWER CONTROLLER
USER'S MANUAL
EK-861AB-OP-001

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