

## Chapter 18

# Monitoring Power Supplies

You monitor and maintain the power supplies to ensure that power is distributed to the router components. (See Table 53.)

**Table 53: Checklist for Monitoring Power Supplies**

Monitor Power Supply Tasks	Command or Action
<b>Understanding Power Supplies on page 218</b>	
M5/M10 Router Power Supplies on page 219	
M7i Router Power Supplies on page 220	
M10i Router Power Supplies on page 221	
M20 Router Power Supplies on page 222	
M40 Router Power Supplies on page 223	
M40e Router Power Supplies on page 224	
M160 Router Power Supplies on page 226	
M320 Router Power Supplies on page 227	
T320 Router Power Supplies on page 228	
T640 Routing Node Power Supplies on page 229	
<b>Checking the Power Supply Cables on page 229</b>	Check the power supply cables.
<b>Checking the Power Supply Status on page 230</b>	
1. Check the Power Supply Environmental Status on page 230	show chassis environment (M40e, M160, and T320 router and T640 routing node only) show chassis environment pem <i>slot</i>
2. Check the Power Supply LEDs on page 232	Check the LEDs on the power supply faceplate.
<b>Checking for Power Supply Alarms on page 235</b>	
1. Display Current Power Supply Alarms on page 235	show chassis alarms
2. Display Power Supply Error Messages in the System Log File on page 238	show log messages   match "power supply"
3. Display Power Supply Error Messages in the Chassis Daemon Log File on page 238	show log chassisd   match pem
<b>Verifying Power Supply Failure on page 239</b>	
1. Check the Power Supply Power Switch on page 239	Check the power supply power switch.
2. Check the Circuit Breaker on page 239	Make sure that the power switch is on.
3. Perform a Power Supply Swap Test on page 240	Replace the faulty power supply with one that works.
4. Check the Router Cooling System on page 240	show chassis environment

Monitor Power Supply Tasks	Command or Action
5. Test the Power Supply on page 241	Press the power supply self-test button.
<b>Getting Power Supply Hardware Information on page 241</b>	
1. Display the Power Supply Hardware Information on page 242	show chassis hardware
2. Locate the Power Supply Serial Number ID Label on page 242	Look on the power supply faceplate or look on the back of the power supply.
<b>Replacing the Power Supplies on page 250</b>	(M5, M10, M20, and M40 routers) Turn off the power to the individual power supply before removing it from the chassis. (M40e, M160, and T320 routers and T640 routing node) Switch the corresponding circuit breaker off before removing the power supply. Follow the procedure in the appropriate router hardware guide.

## Understanding Power Supplies

**Purpose** Inspect the power supplies to ensure that they distribute power to the other router components according to their voltage requirements.

**What Is a Power Supply** The power supplies are internally connected to the midplane, which delivers the power input from the circuit breaker box and distributes the different output voltages produced by the power supplies to the router's components, depending on their voltage requirements.

Table 54 lists some router characteristics for each router type.

**Table 54: Router Power Supply Characteristics**

Power Supply Characteristic	M5/ M10	M7i/ M10i	M20	M40	M40e	M160	M320	T320	T640
Watts per AC/DC power supply	434 W	293 W	750 W	1500 W	AC 2900 W DC 3000 W	DC original 2600 W DC enhanced 3200 W	1750 W	3200 W	6500 W
Supports both AC and DC power supplies	Yes	Yes	Yes	Yes	Yes	No; original or enhanced DC only	Yes	No; DC only	No; DC only
Turn off power supply before removing	X	X	X	X					
Turn off circuit breaker before removing power supply					X	X	X	X	X

Power supplies in the router must be of the same type: either two AC or two DC power supplies. You cannot mix power supply types. The M160 router supports DC power supplies only.

The following sections describe each routing platform power supply location and type:

M5/M10 Router Power Supplies on page 219

M7i Router Power Supplies on page 220

M10i Router Power Supplies on page 221

M20 Router Power Supplies on page 222

M40 Router Power Supplies on page 223

M40e Router Power Supplies on page 224

M160 Router Power Supplies on page 226

M320 Router Power Supplies on page 227

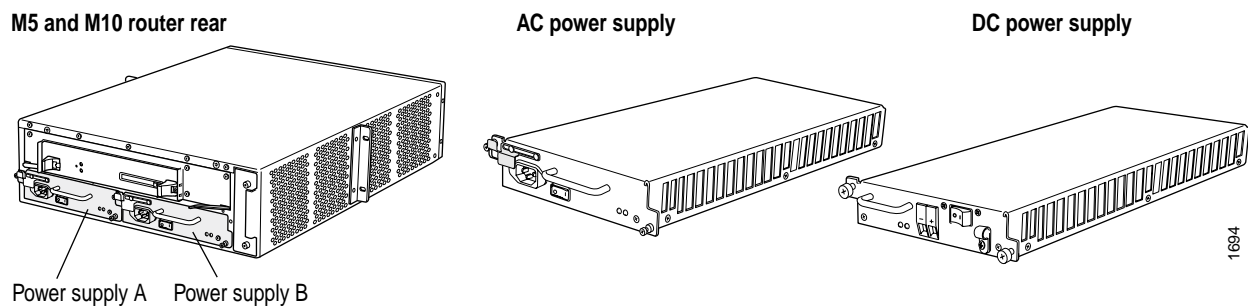
T320 Router Power Supplies on page 228

T640 Routing Node Power Supplies on page 229

### ***M5/M10 Router Power Supplies***

Two load-sharing, isolated power supplies are located at the bottom rear of the M5 and M10 router chassis. The routers use either AC or DC power. Figure 85 shows the M5 and M10 router power supplies and where they are installed in the chassis.

**Figure 85: M5 and M10 Router Power Supplies**



When the power supplies are installed and operational, they automatically share the electrical load. If a power supply stops functioning for any reason, the remaining power supply instantly begins providing all the power the router needs for normal functioning and can provide full power indefinitely.



**NOTE:** Mixing AC and DC power supplies is not supported. The two power supplies must be either both AC or both DC.

When two power supplies are installed, at least one Routing Engine and one FPC must also be installed for both power supplies to power on. In the absence of this minimum load, only one power supply starts. (The router powers on and operates correctly with one power supply, but without the redundancy benefit of having a second power supply installed.)

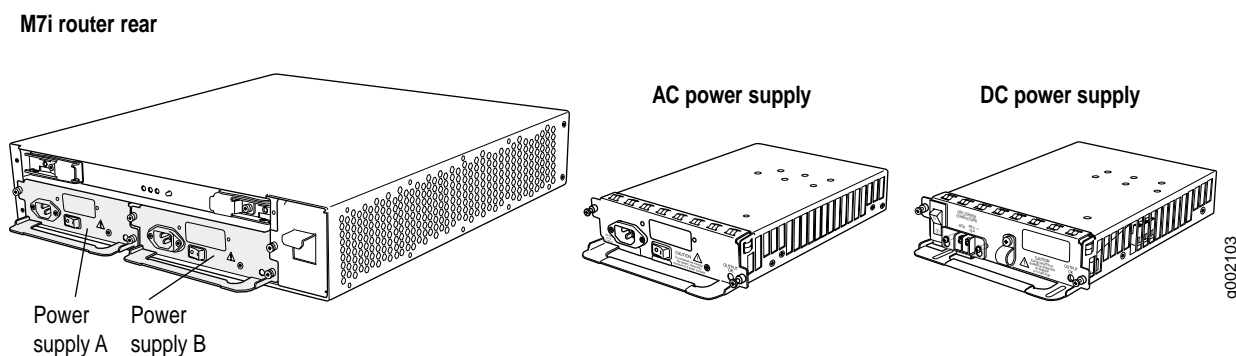
### M7i Router Power Supplies

Two load-sharing, isolated power supplies are located at the bottom rear of the M7i router chassis. The router uses either AC or DC power. Figure 86 shows the M7i router power supplies and where they are installed in the chassis.

When the power supplies are installed and operational, they automatically share the electrical load.

For full redundancy, two power supplies are required. If a power supply stops functioning for any reason, the second power supply instantly begins providing all the power the router needs for normal functioning. The second power supply can provide full power indefinitely.

Figure 86: M7i Router Power Supplies



**NOTE:** When two power supplies are installed, at least one Routing Engine and one FPC must also be installed for both power supplies to power on. In the absence of this minimum load, only one power supply starts. (The router powers on and operates correctly with one power supply, but without the redundancy benefit of having a second power supply installed.)

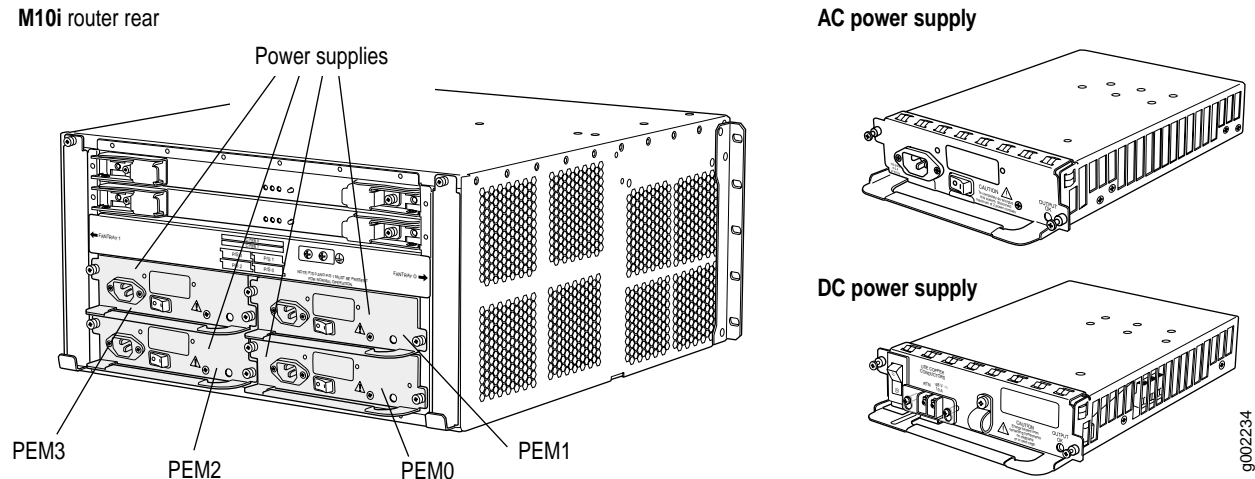
## M10i Router Power Supplies

The M10i router uses either AC or DC power. You can install up to four load-sharing power supplies at the bottom rear of the chassis. Figure 87 shows the M10i router power supplies and where they are installed in the chassis.

The AC power supplies are fully redundant. If one power supply fails or is removed, the remaining power supplies instantly assume the entire electrical load. Two power supplies can provide full power for as long as the router is operational. Three power supplies are required for redundancy. Power supplies must be present in slots P/S 0 and P/S 1 for the router to operate.

The DC power supplies are fully redundant. The DC power supplies in slots P/S 0 and P/S 1 can provide full power to the router. Likewise, the DC power supplies in slots P/S 2 and P/S 3 can also provide full power. The DC power supplies in slots P/S 2 and P/S 3 jointly serve as the backup to the DC power supplies in slots P/S 0 and P/S 1. Power supplies must be present in slots P/S 0 and P/S 1 for the router to operate.

**Figure 87: M10i Router Power Supplies**



**NOTE:** AC and DC power supplies are required in slots P/S 0 and P/S 1 for the router to operate.

The DC power supplies in slots P/S 0 and P/S 1 must be powered by dedicated power feeds derived from feed A, and the DC power supplies in slots P/S 2 and P/S 3 must be powered by dedicated power feeds derived from feed B. This configuration provides the commonly deployed A/B feed redundancy for the system.

## M20 Router Power Supplies

Two load-sharing, isolated power supplies are located at the bottom rear of the M20 router chassis. The router uses either AC or DC power. Figure 88 shows the M20 router power supplies and where they are installed in the chassis.

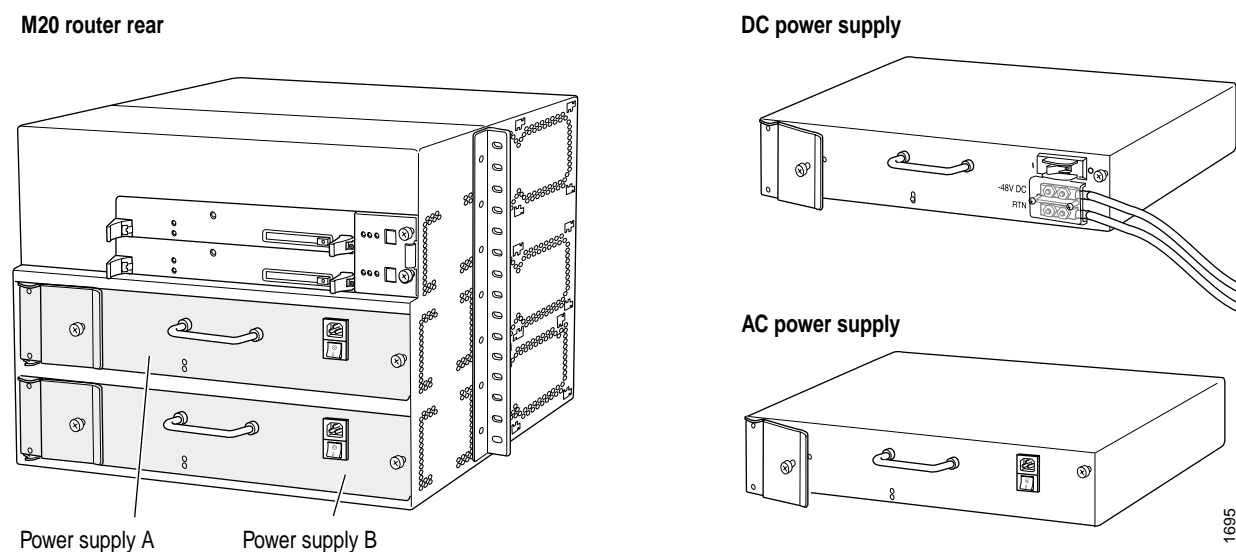
When the power supplies are installed and operational, they automatically share the electrical load. If a power supply stops functioning for any reason, the remaining power supplies instantly begin providing all the power the router needs for normal functioning, and can provide full power indefinitely.



**NOTE:** Mixing AC and DC power supplies is not supported. The two power supplies must be either both AC or both DC.

When two power supplies are installed, at least one Routing Engine and one FPC must also be installed for both power supplies to power on. In the absence of this minimum load, only one power supply starts. (The router powers and on and operates correctly with one power supply, but without the redundancy benefit of having a second power supply installed.)

Figure 88: M20 Router Power Supplies

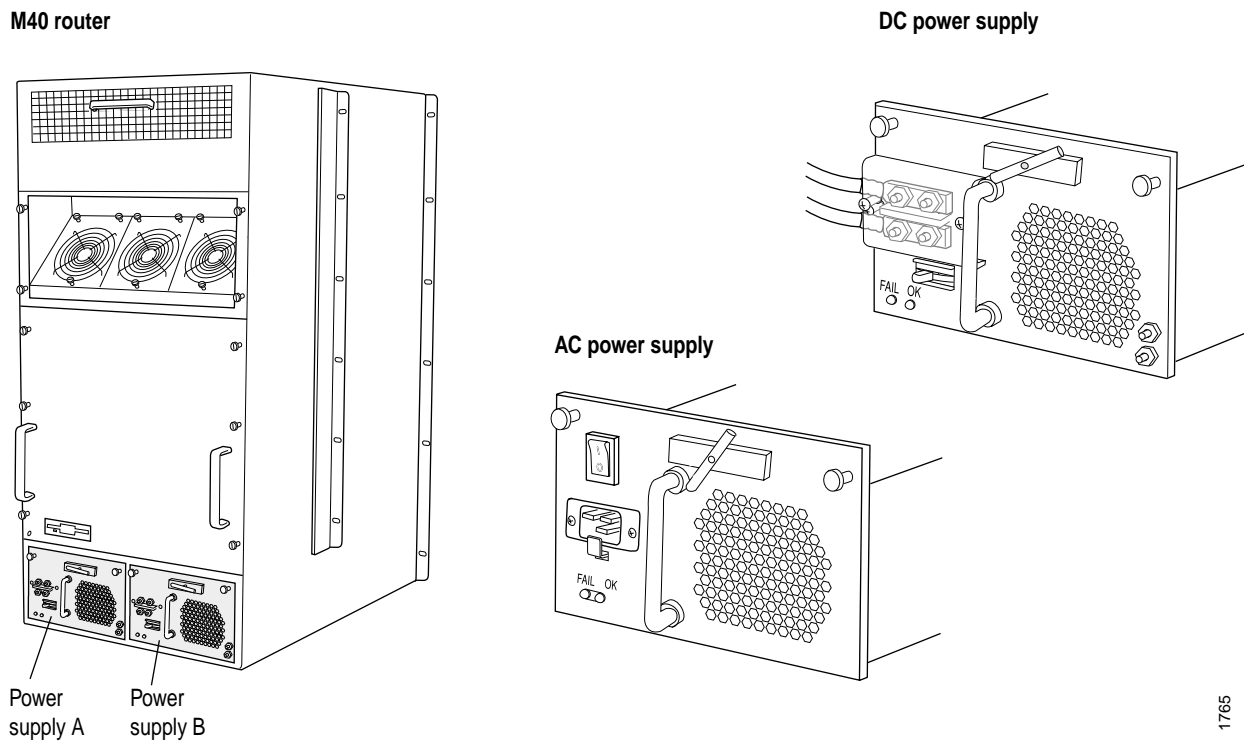


## M40 Router Power Supplies

The M40 router can use either AC or DC power. Two load-sharing power supplies install into the bays located at the bottom rear of the chassis. As viewed from the rear of the chassis, the supply on the left is referred to as supply A and the supply on the right as supply B. Figure 89 shows the M40 router power supplies and where they are installed in the chassis.

The power supplies are fully redundant. When both power supplies are operational, they automatically share the electrical load. If one power supply stops functioning for any reason, the remaining power supply instantly begins providing all the power the router needs for normal functioning, and can provide full power indefinitely.

Figure 89: M40 Router Power Supplies



## ***M40e Router Power Supplies***

The M40e router uses either AC or DC power. Two load-sharing, pass-through power supplies are located at the bottom rear of the chassis. Figure 90 shows the M40e router power supplies and where they are installed in the chassis.

When the power supplies are installed and operational, they automatically share the electrical load. If a power supply stops functioning for any reason, the remaining power supplies instantly begin providing all the power the router needs for normal functioning, and can provide full power indefinitely.



**NOTE:** Mixing AC and DC power supplies is not supported and prevents the router from booting. If two power supplies are installed, they must be either both AC or both DC.

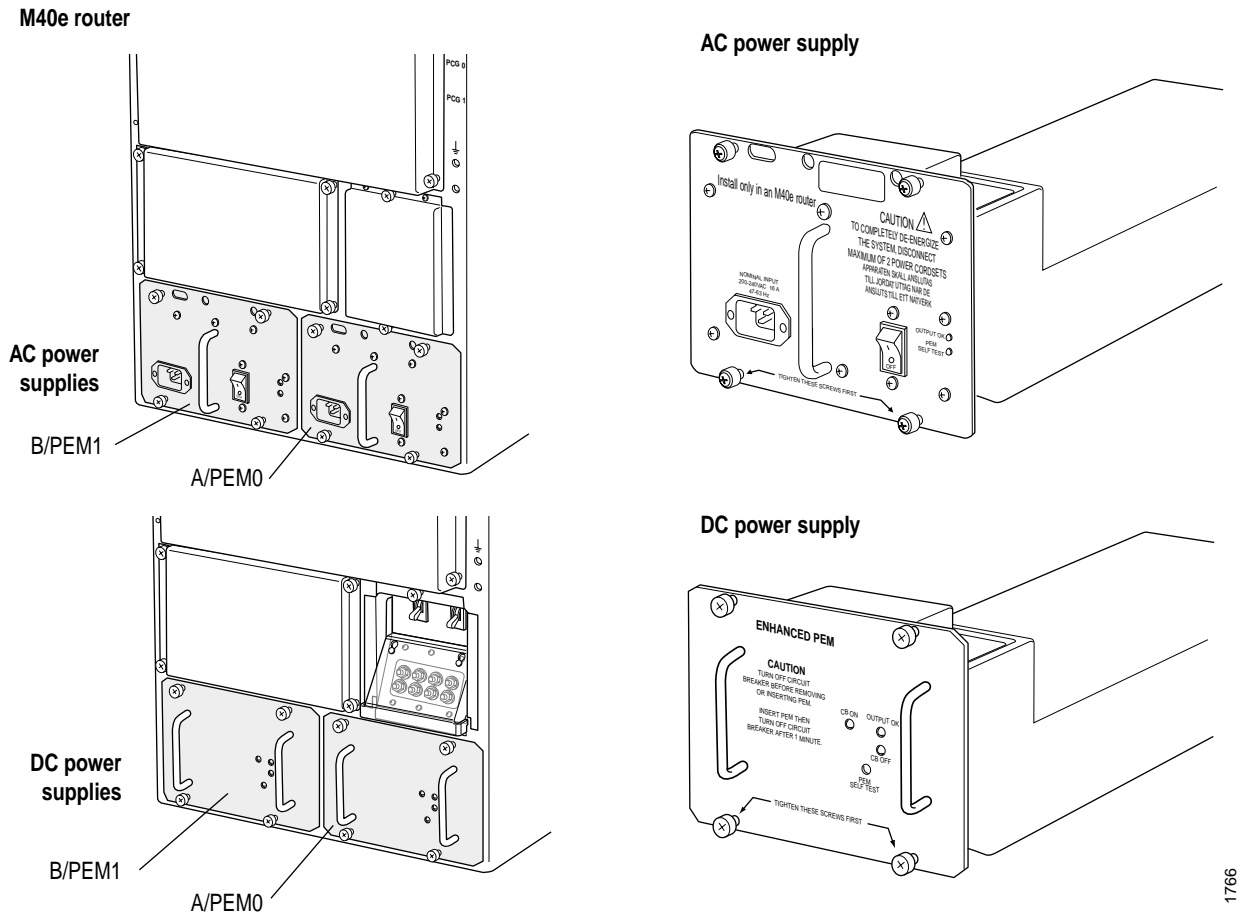
A circuit breaker box must be installed on a DC-powered router, while a circuit breaker is incorporated into each AC power supply. Converting the router from AC to DC power or vice versa involves removing or installing the circuit breaker box. Only authorized service personnel should perform the conversion; this manual does not include instructions.

When two power supplies are installed, at least one Routing Engine and one FPC must also be installed for both power supplies to power on. In the absence of this minimum load, only one power supply starts. (The router powers on and operates correctly with one power supply, but without the redundancy benefit of having a second power supply installed.)

---



Figure 90: M40e Router Power Supplies

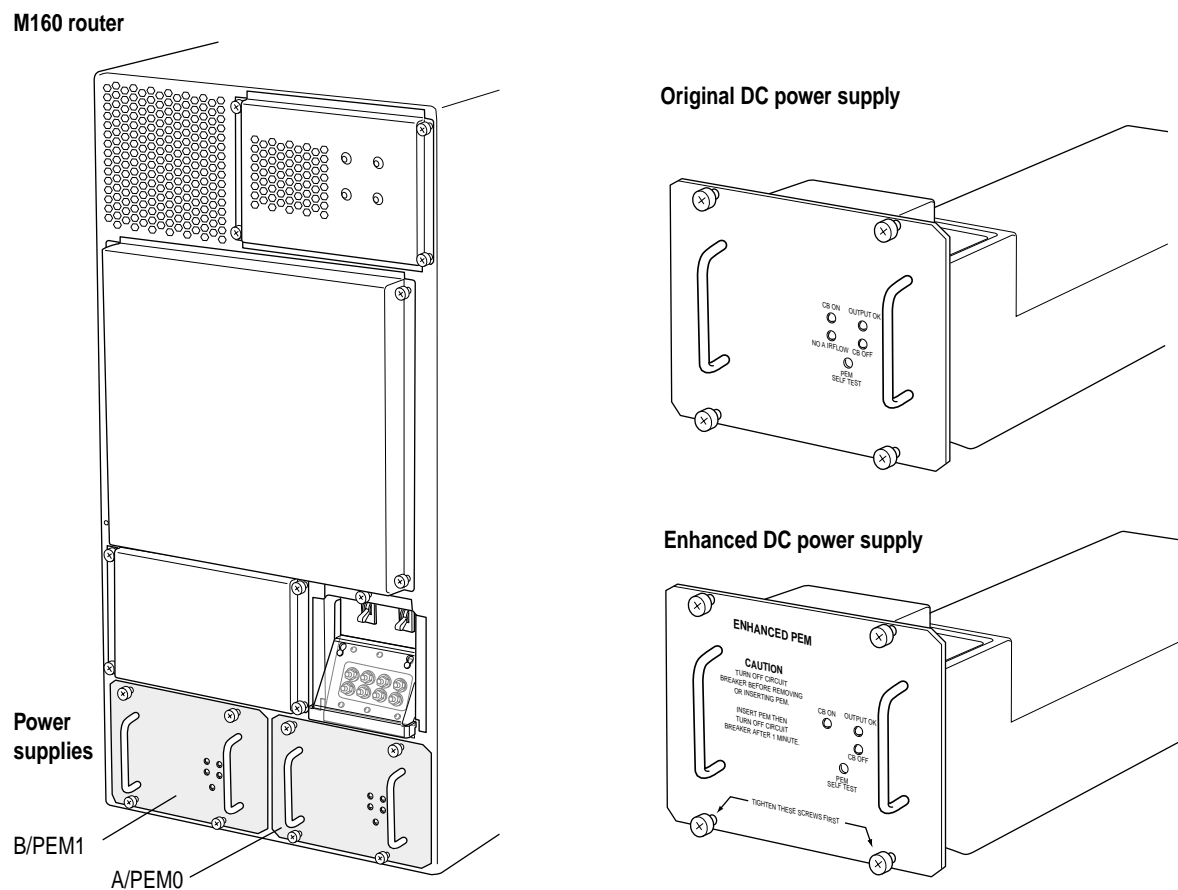


## M160 Router Power Supplies

The M160 router uses DC power. Two load-sharing, pass-through power supplies are located at the bottom rear of the chassis. Figure 91 shows the M160 router power supplies and where they are installed in the chassis.

When the power supplies are installed and operational, they automatically share the electrical load. If a power supply stops functioning for any reason, the remaining power supplies instantly begin providing all the power the router needs for normal functioning, and can provide full power indefinitely.

Figure 91: M160 Router Power Supplies



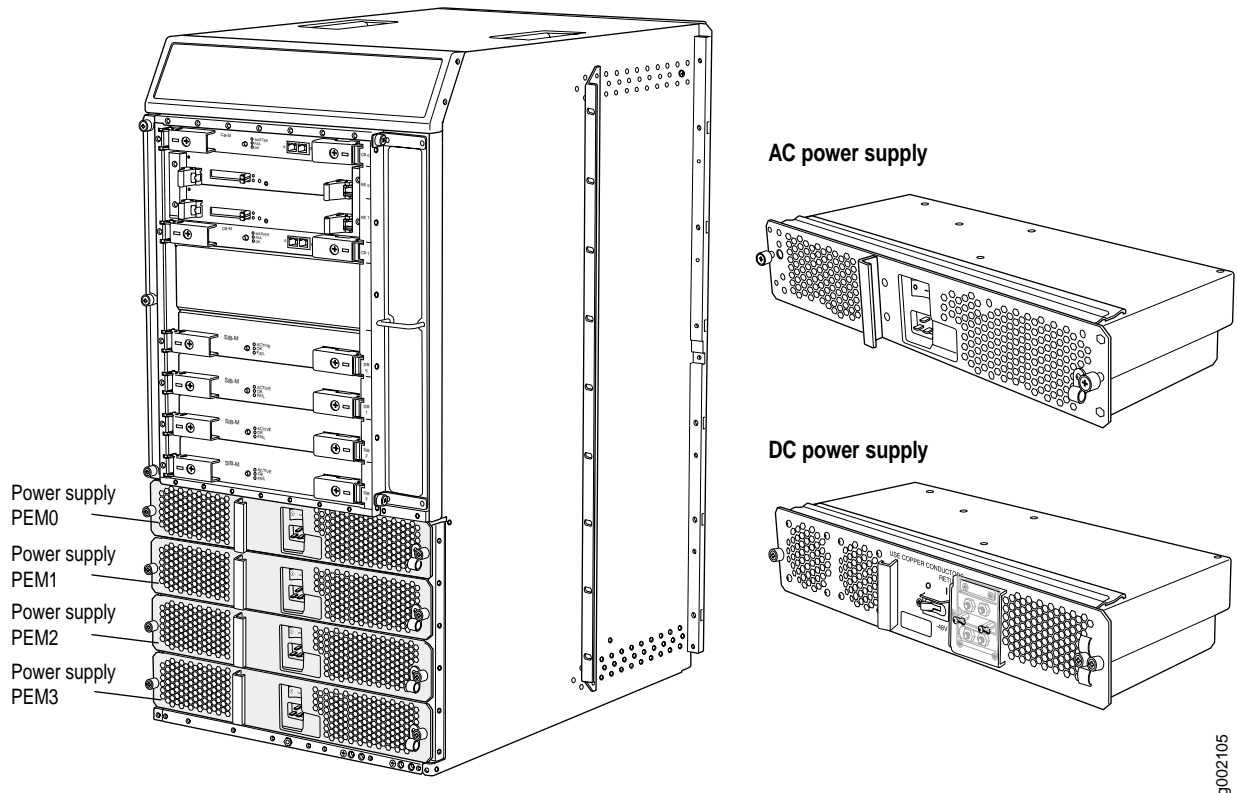
1767

## M320 Router Power Supplies

The M320 router uses either AC or DC power. Figure 92 shows the M320 router power supplies and where they are installed in the chassis.

Figure 92: M320 Router Power Supplies

M320 router rear



The M320 router supports four power supplies. The AC power supplies are fully redundant. If one power supply fails or is removed, the remaining power supplies instantly assume the entire electrical load. Three power supplies can provide full power for as long as the router is operational.

In the M320 router DC power supply configuration, the router has four DC power supplies, located at the lower rear of the chassis in slots PEM0 through PEM3 (top to bottom). The DC power supplies in slots PEM0 and PEM2 are load-sharing and provide power to the Flexible PIC Concentrators (FPCs) in slots FPC3 through FPC7. The DC power supplies in slots PEM1 and PEM3 are load-sharing and provide power to the FPCs in slots FPC0 through FPC2, Switch Interface Boards (SIBs), Control Boards, and Routing Engines. All DC power supplies provide power to the fan trays.



**NOTE:** The DC power supplies in slots PEM0 and PEM1 must be powered by dedicated power feeds derived from feed A, and the DC power supplies in slots PEM2 and PEM3 must be powered by dedicated power feeds derived from feed B. This configuration provides the commonly deployed A/B feed redundancy for the system.



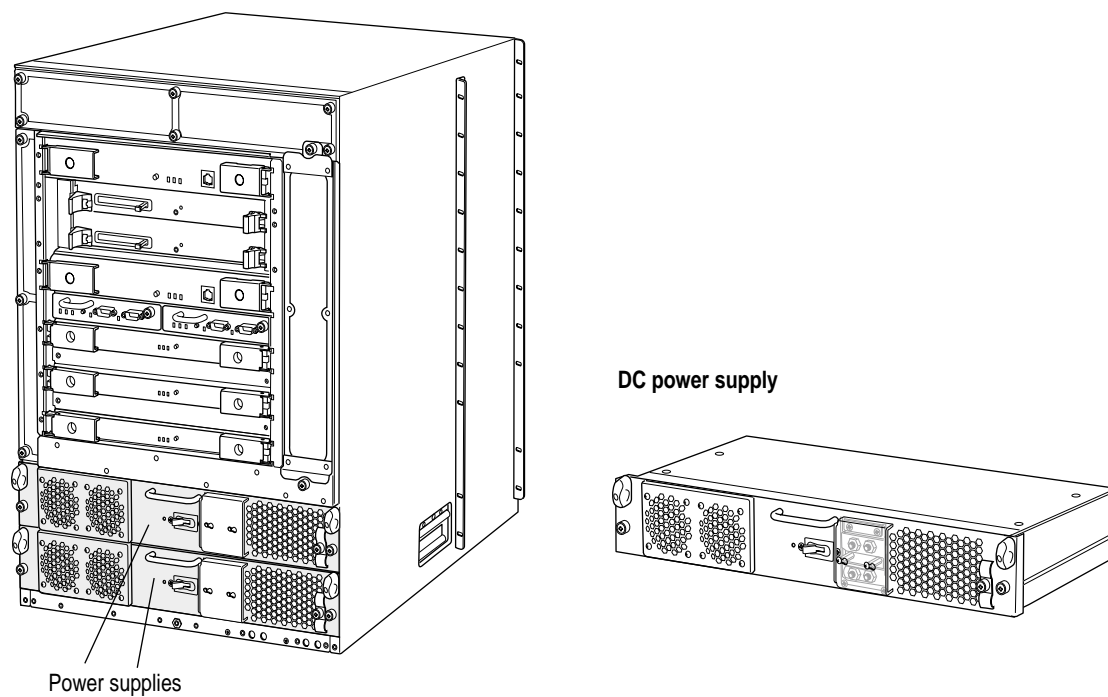
**NOTE:** Each power supply must be connected to a dedicated AC power feed and a dedicated 15 A (250 VAC) circuit breaker.

### T320 Router Power Supplies

Figure 93 shows the T320 router power supplies and where they are installed in the chassis.

**Figure 93: T320 Router Power Supplies Location**

T320 router rear

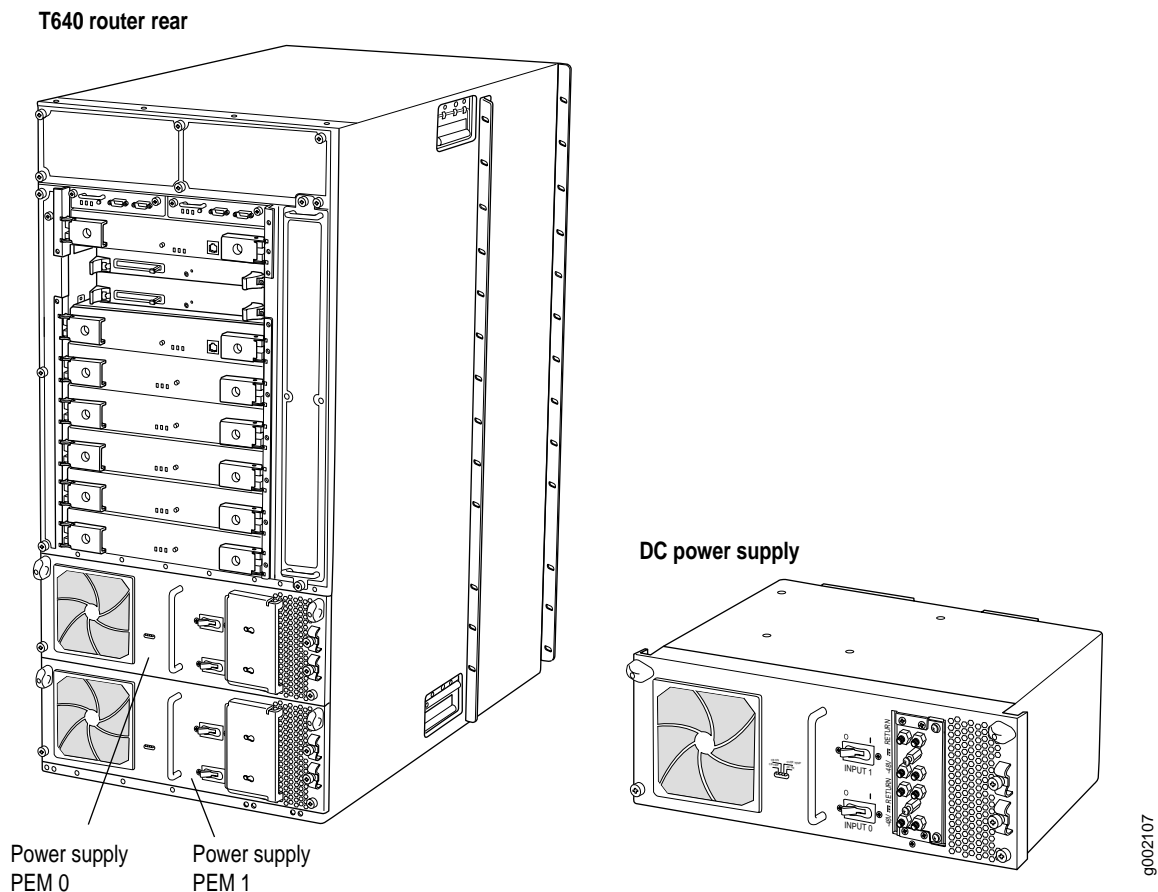


9002106

## T640 Routing Node Power Supplies

Figure 94 shows the T640 routing node power supplies and where they are installed in the chassis.

Figure 94: T640 Routing Node Power Supplies



**See Also** Monitoring Redundant Power Supplies on page 507

## Checking the Power Supply Cables

**Action** To check the power supply cables, follow these steps:

1. Verify that the power cable or power cord from the power source to the router is not damaged. If the insulation is cracked or broken, immediately replace the cord or cable.
2. Make sure that the power and ground cables on each DC power supply are arranged so that they do not obstruct access to the other power supply or to the Routing Engine.
3. Periodically inspect the site to ensure that the cables connected to the power supply are securely in place and are properly insulated.

## Checking the Power Supply Status

---

**Steps To Take** To check the power supply status, follow these steps:

1. Check the Power Supply Environmental Status on page 230
2. Check the Power Supply LEDs on page 232

### **Step 1: Check the Power Supply Environmental Status**

**Action** To check the power supply environmental status, use the following JUNOS command-line interface (CLI) operational mode command:

```
user@host> show chassis environment
```

**Sample Output** For M5, M10, M20, and M40 routers:

```
user@host> show chassis environment
Class Item          Status  Measurement
Power Power Supply A    OK
      Power Supply B    Absent
[...Output truncated...]
```

For M7i and M10i routers:

```
user@host> show chassis environment
Class Item          Status  Measurement
Power Power Supply 0    OK
      Power Supply 1    Absent
[...Output truncated...]
```

For M40e, M160, M320 and T320 routers and T640 routing nodes:

```
user@host> show chassis environment
Class Item          Status  Measurement
Power PEM 0          OK
      PEM 1            OK
[...Output truncated...]
```

**What It Means** The command output displays the status of both power supplies installed in the router.

For M5, M10, M7i, M10i, M20, and M40 routers, the command output displays the power supply slot number and status. The status can be OK, Testing (during initial power-on), Failed, or Absent. A Failed condition triggers the red alarm LED on the craft interface.

For M40e, M160, M320, and T320 routers and T640 routing nodes, the output displays the power supply slot number and status for the Power Entry Modules (PEMs). The status can be OK, Absent, or Check.

**Alternative Action** For the M40e, M160, M320, and T320 routers and the T640 routing node, to display the power supply status, use the following CLI command:

```
user@host> show chassis environment pem
```

```
user@host> show chassis environment pem
```

PEM 0 status:

```
State      Online
Temperature OK
DC input   OK
DC output  OK
Load       Less than 20 percent
```

Voltage:

```
48.0 V input   69028 mV
48.0 V fan supply 48839 mV
5.0 V bias     5013 mV
8.0 V bias     8253 mV
```

PEM 1 status:

```
State      Online
Temperature OK
DC input   OK
DC output  OK
Load       Less than 20 percent
```

Voltage:

```
48.0 V input   69307 mV
48.0 V fan supply 49170 mV
5.0 V bias     4991 mV
8.0 V bias     8263 mV
```

For each PEM, the command output displays the slot number, status, temperature, DC input and output, load percentage, and voltage. You can display the status of a particular power supply by specifying the *slot* number.

For T320 routers and T640 routing nodes, the command output displays the PEM slot number, status, temperature, DC input status, and DC output for each Flexible PIC Concentrator (FPC), SONET Clock Generator (SCG), Control Board, and Switch Interface Board (SIB). You can display the status of a particular power supply by specifying the *slot* number.

```
user@host> show chassis environment pem
```

PEM 1 status:

```
State      Online
Temperature 33 degrees C / 91 degrees F
DC input:   OK
DC Output:  Voltage Current Power Load
FPC 0      53783  3368   181   24
FPC 1       0    0    0    0
FPC 2       0    0    0    0
FPC 3       0    0    0    0
FPC 4      54041  3462   187   24
FPC 5      53883  5187   279   37
FPC 6       0    0    0    0
FPC 7       0    0    0    0
SCG/CB/SIB 54066  4031   217   18
```

## Step 2: Check the Power Supply LEDs

**Action** To check the power supply status, look at the four LEDs on the faceplate. Table 55 describes the M5 and M10 router output LED and self-test button for both the AC and DC power supplies.

**Table 55: M5 and M10 Router Power Supply LED and Self-Test Button**

Label	Color	State	Description
OUTPUT OK	Blue	On steadily	Power supply is functioning normally, input is occurring, outputs are within range, and the temperature is within range.
		Blinking	Power supply has failed.
SELF-TEST	(button)	–	Power supply is in self-test mode.

Table 56 describes the functions of the LED on both the M7i and M10 router AC and DC power supplies.

**Table 56: M7i and M10i Router AC/DC Power Supply LED**

Label	Color	State	Description
OUTPUT OK	Green	On steadily	Power supply is inserted and is functioning normally, input is occurring, outputs are within range, and the temperature is within range.
		Blinking	Power supply is not functioning, is starting up, or is not properly inserted, or airflow is not sufficient.

Table 57 describes the functions of the M20 router power supply LEDs.

**Table 57: M20 Router Power Supply LEDs**

Label	Color	State	Description
OK	Green	On steadily	Power supply is functioning normally, input is occurring, outputs are within range, temperature is within range, and fans are operational.
FAIL	Amber	On steadily	Power supply has failed.

Table 58 describes the functions of the M40 router power supply LEDs.

**Table 58: M40 Router Power Supply LEDs**

Label	Color	State	Description
OK	Green	On steadily	Power supply is functioning normally, input is occurring, outputs are within range, temperature is within range, and fans are operational.
FAIL	Red	On steadily	Power supply has failed.



Table 59 describes the functions of the M40e router AC power supply LED.

**Table 59: M40e Router AC Power Supply LED**

Label	Color	State	Description
OUTPUT OK	Green	On steadily	Power supply is inserted and is functioning normally.
		Blinking slowly	Power supply is not plugged in, or power switch is in the off position (when other AC power supply is functioning).
		Blinking rapidly	Power supply is starting up.

Table 60 describes the functions of the M40e router DC power supply LEDs.

**Table 60: M40e Router DC Power Supply LEDs**

Label	Color	State	Description
CB ON	Green	On steadily	Power supply is inserted correctly and is receiving power. Circuit breaker is on.
OUTPUT OK	Blue	On steadily	Power supply is inserted and is functioning normally.
		Blinking	Power supply is not functioning, is starting up, is not properly inserted, or airflow is not sufficient.
CB OFF	Amber	On steadily	Power supply is functioning, but the circuit breaker is off.

Table 61 describes the functions of the M160 router DC power supply LEDs.

**Table 61: M160 Router Power Supply LEDs**

LED	Color	State	Description
CB ON	Green	On steadily	Power supply is inserted correctly and is receiving power. Circuit breaker is on.
OUTPUT OK	Blue	On steadily	Power supply is inserted and is functioning normally.
		Blinking	Power supply is not functioning, is going through startup, is not properly inserted, or airflow is not sufficient.
		Off	Power supply is not functioning.
NO AIRFLOW (Original power supply only)	Amber	On steadily	Power supply is inserted, but airflow around the power supply is not sufficient.
CB OFF	Amber	On steadily	Power supply is functioning, but the circuit breaker is off.

Table 62 describes the functions of the M320 router AC and DC power supply LED.

**Table 62: M320 Router AC/DC Power Supply LED**

Label	Color	State	Description
OUTPUT OK	Blue	Off	No power applied to power supply.
		Blinking	Power supply blinks for 5 seconds after initial power on.
			Power supply is installed, but not powered on, and is receiving bias power from a powerword on power supply.
			Input voltage is invalid Power supply has failed.
		On steadily	Power supply is functioning normally.

Table 63 describes the functions of the M320 router AC and DC power supply LED.

**Table 63: T320 Router DC Power Supply LED**

Label	Color	State	Description
DC OK	Blue	On steadily	Power supply is installed correctly and is functioning normally.
		Blinking	Power supply is starting up, is not functioning, or is not properly installed.

Table 64 describes the functions of the T640 routing node DC power supply LEDs.

**Table 64: T640 Routing Node Power Supply LEDs**

LED	Color	State	Description
CB ON	Green	On steadily	Power supply is installed correctly and is functioning normally, is receiving power, and the circuit breaker is on.
CB TRIP	Amber	On steadily	Circuit breaker not turned on, or host subsystem has detected a failure and has turned the circuit breaker off.
OVER TEMP	Amber	On steadily	Power supply has exceeded the recommended temperature.
DC OK	Blue	On steadily	Power supply is installed correctly and is functioning normally.
		Blinking	Power supply is starting up, is not functioning, or is not properly installed.

**Alternative Actions** For M40e and M160 routers, if all LEDs are off on both power supplies, either someone has switched off power to the router or the system temperature has exceeded the acceptable maximum. The host module shuts down both power supplies. There is no power to the router, so the alarm LEDs on the craft interface are not lit and the LCD display is blank.

Excessive system temperature is almost always caused by excessive environmental temperature. Correct the environmental temperature before repowering the router.

If all LEDs on one power supply are off, but the LEDs on the other supply indicate that it is functioning properly, or the LEDs on both power supplies indicate a problem, do the following:

1. Check the current alarms by using the show chassis alarms CLI command or by looking at the router craft interface.
2. Check that the power switch is in the ON (I) position (on the circuit breaker box for a DC-powered router, or on the power supply faceplate for an AC-powered router).
3. Perform a swap test on the power supplies (see “Perform a Power Supply Swap Test” on page 240).

## Checking for Power Supply Alarms

---

For a listing of power supply alarm conditions, remedy, and alarm severity by routing platform type, see “Display the Current Router Alarms” on page 61.

**Steps To Take** To check for power supply alarms, follow these steps:

1. Display Current Power Supply Alarms on page 235
2. Display Power Supply Error Messages in the System Log File on page 238

### ***Step 1: Display Current Power Supply Alarms***

**Action** To display power supply alarms, use the following CLI command:

```
user@host> show chassis alarms
```

**Sample Output**

```
user@host> show chassis alarms
4 alarms currently active
Alarm time      Class Description
2002-04-08 15:25:12 PDT Major Power Supply A 2.5 volt output failed
2002-04-08 15:25:12 PDT Major Power Supply A 5 volt output failed
2002-04-08 15:25:12 PDT Major Power Supply A 3.3 volt output failed
2002-04-08 15:25:12 PDT Major Power Supply A fan failed
```

**What It Means** The command output displays the alarm date, time, severity level, and description. Table 65 shows the power supply alarm descriptions that you see on the craft interface LCD and the alarms that you see at the CLI. For information about conditions that trigger power supply alarms, see “Gather Component Alarm Information” on page 60.

**Table 65: Power Supply Alarms**

Power Supplies	Craft Interface LCD Short Version	CLI Long Version
M5 and M10	N/A	Power supply x not providing power
M7i and M10i	N/A	Power supply x not providing power
M20	N/A	Power supply x not providing power
	N/A	Power supply x 3.3V failed
	N/A	Power supply x 5V failed
	N/A	Power supply x 2.5V failed
M40	Supply x FAIL	Power supply x not providing power
	Supply x 3V FAIL	Power supply x 3.3V failed
	Supply x 5V FAIL	Power supply x 5V failed
	Supply x 2V FAIL	Power supply x 2.5V failed
M40e	PEM <i>pem-ID</i> Removed	YELLOW ALARM - PEM <i>pem-ID</i> Removed
	PEM <i>pem-ID</i> High Temp	RED ALARM - PEM <i>pem-ID</i> High Temperature
	PEM <i>pem-ID</i> Output Fail	RED ALARM - PEM <i>pem-ID</i> Output Failure
	PEM <i>pem-ID</i> Input Fail	RED ALARM - PEM <i>pem-ID</i> Input Failure
M160	PEM <i>pem-number</i> Removed	YELLOW ALARM - PEM <i>pem-number</i> Removed
	PEM <i>pem-number</i> High Temp	RED ALARM - PEM <i>pem-number</i> High Temperature
	PEM <i>pem-number</i> Output Fail	RED ALARM - PEM <i>pem-number</i> Output Failure
	PEM <i>pem-number</i> Input Fail	RED ALARM - PEM <i>pem-number</i> Input Failure

Power Supplies	Craft Interface LCD Short Version	CLI Long Version
T320	PEM <i>pem-number</i> Removed	YELLOW ALARM - PEM <i>pem-number</i> Removed
	PEM <i>pem-number</i> Over Temp	RED ALARM - PEM <i>pem-number</i> Over Temperature
	PEM <i>pem-number</i> Output Fail	RED ALARM - PEM <i>pem-number</i> Output Failure
	PEM <i>pem-number</i> Input Fail	RED ALARM - PEM <i>pem-number</i> Input Failure
T640	PEM <i>pem-number</i> Removed	YELLOW ALARM—PEM <i>pem-number</i> Removed
	PEM <i>pem-number</i> Over Temp	RED ALARM—PEM <i>pem-number</i> Over Temperature
	PEM <i>pem-number</i> Output Fail	RED ALARM—PEM <i>pem-number</i> Output Failure
	PEM <i>pem-number</i> Input Fail	RED ALARM—PEM <i>pem-number</i> Input Failure

For information about what conditions trigger power supply alarms and their remedy for each router type, see “Display the Current Router Alarms” on page 61.

**Alternative Action** To display current power supply alarms and the alarm indicator states, use the following CLI command:

```
user@host> show chassis craft-interface
```

**Sample Output**

```
Red alarm:  LED on, relay on
Yellow alarm: LED off, relay off
Host OK LED:  On
Host fail LED: Off
```

```
FPCs   0 1 2 3
```

```
-----
```

```
Green  * * * *
```

```
Red    . . . .
```

```
LCD screen:
```

```
+-----+
|myrouter      |
|4 Alarms active |
|R: Supply A 2v FAIL |
|R: Supply A 5v FAIL |
+-----+
```

**What It Means** The command output displays the alarm indicator status and the alarms that display on the craft interface LCD display.

(For M7i router) Check the red and yellow alarm LEDs on the FIC. Power supply failure or removal triggers an alarm that causes one or both of the LEDs to light.

## Step 2: Display Power Supply Error Messages in the System Log File

**Action** To display power supply error messages that are generated in the system log file, use the following CLI command:

```
user@host> show log messages | match "power supply"
```

**Sample Output**

```
user@host> show log messages | match "power supply"
Apr 8 14:00:15 myrouter scb CM: ALARM SET: (Major) Power Supply A fan failed
Apr 8 14:00:15 myrouter alarmd[584]: Alarm cleared: Pwr supply color=RED, class=CHASSIS, myrouter=Power Supply A fan failed
Apr 8 14:00:18 myrouter scb CM: ALARM CLEAR: Power Supply A fan failed
Apr 8 14:00:21 myrouter alarmd[584]: Alarm set: Pwr supply color=RED, class=CHASSIS, reason=Power Supply A fan failed
Apr 8 14:00:23 myrouter scb CM: ALARM SET: (Major) Power Supply A fan failed
Apr 8 14:05:16 myrouter alarmd[584]: Alarm set: Pwr supply color=RED, class=CHASSIS, reason=Power Supply A fan failed
```

**What It Means** The messages system log file records the time the failure or event occurred, the severity level, a code, and a message description. Use the `show log messages | match "power supply"` command to view only power supply error messages. Use this information to diagnose a power supply problem and to let the Juniper Networks Technical Assistance Center (JTAC) know what error messages were generated and the router events prior to the problem. For more information about system log messages, see the *JUNOS System Log Messages Reference*.

## Step 3: Display Power Supply Error Messages in the Chassis Daemon Log File

**Action** To display power supply error messages in the chassisd log file, use the following CLI command:

```
user@host> show log chassisd | match pem
```

**Sample Output**

```
user@host> show log chassisd | match pem
Jul 15 11:18:59 CMB cmd to PEM#0 [0xf8], Amber LED Off [0x18]
Jul 15 11:18:59 PEM#0 - Amber LED Off
Jul 15 11:18:59 CMB cmd to PEM#0 [0xf8], Green LED Off [0x1a]
Jul 15 11:18:59 PEM#0 - Green LED Off
Jul 15 11:18:59 CMB cmd to PEM#0 [0xf8], Blue LED Off [0x16]
Jul 15 11:18:59 PEM#0 - Blue LED Off
Jul 15 11:18:59 CMB cmd to PEM#1 [0xf9], Amber LED Off [0x18]
Jul 15 11:18:59 PEM#1 - Amber LED Off
Jul 15 11:18:59 CMB cmd to PEM#1 [0xf9], Green LED Off [0x1a]
Jul 15 11:18:59 PEM#1 - Green LED Off
Jul 15 11:18:59 CMB cmd to PEM#1 [0xf9], Blue LED Off [0x16]
Jul 15 11:18:59 PEM#1 - Blue LED Off
Jul 15 11:19:02 PEM#0 added
Jul 15 11:19:02 reading PEM 0 initial state
Jul 15 11:19:02 PEM#1 added
Jul 15 11:19:02 reading PEM 1 initial state
Jul 15 11:19:18 CHASSISD_PEM_INPUT_BAD: PEM 1 - INPUT FAIL, status bits: 0xf2, check breaker
Jul 15 11:19:18 CHASSISD_SNMP_TRAP: SNMP trap: FRU failure: jnxFruContentsIndex 2, jnxFruL1Index 2, jnxFruL2Index 0, jnxFruL3Index 0, jnxFruName PEM 1, jnxFruType 7, jnxFruSlot 2, jnxFruOfflineReason 2, jnxFruLastPowerOff 0, jnxFruLastPowerOn 26221491, jnxFruPowerUpTime 1484
Jul 15 11:19:23 CHASSISD_PEM_INPUT_BAD: PEM 1 - INPUT FAIL, status bits: 0xf2, check breaker
Jul 15 11:19:28 CHASSISD_PEM_INPUT_BAD: PEM 1 - INPUT FAIL, status bits: 0xf2, check breaker
Jul 15 11:19:33 CHASSISD_PEM_INPUT_BAD: PEM 1 - INPUT FAIL, status bits: 0xf2, check breaker
Jul 15 11:19:38 CHASSISD_PEM_INPUT_BAD: PEM 1 - INPUT FAIL, status bits: 0xf2, check breaker
```

**What It Means** The chassisd database provides the date, time, and a component status message. The chassisd database is dynamic. It is initialized at router startup and is updated when components are added or removed.

## Verifying Power Supply Failure

---

**Steps To Take** To verify a power supply failure, follow these steps:

1. Check the Power Supply Power Switch on page 239
2. Check the Circuit Breaker on page 239
3. Perform a Power Supply Swap Test on page 240
4. Check the Router Cooling System on page 240
5. Test the Power Supply on page 241

### Step 1: Check the Power Supply Power Switch

**Action** If the OK power supply LED is off and no red alarm condition exists, check that the power switch is ON.

### Step 2: Check the Circuit Breaker

**Action** To check the circuit breaker, follow these steps:

1. Verify that the source DC or AC circuit breaker has the proper current rating. Each power supply in the router must be connected to a separate power source.
2. Make sure that the power switch is in the ON (I) position in the circuit breaker box for DC-powered routers. If the circuit breaker box has been tripped, reset it.

### Step 3: Perform a Power Supply Swap Test

**Action** To perform a swap test to determine whether a power supply is defective, follow the procedure in the appropriate router hardware guide to remove the faulty power supply and connect it to a different source with a new power cable. If the power supply does not power on, then the power supply is the source of the problem. Return the faulty power supply for replacement, as described in the appropriate router hardware guide.



**CAUTION:** When replacing a power supply, do not leave a slot empty for more than two minutes while the router is operational. The power supply must remain in the chassis for proper airflow.

---



**WARNING:** Do not touch the power connectors on the back side of the power supply. They can contain dangerous voltages.

---

## Step 4: Check the Router Cooling System

The power supplies require an unobstructed airflow.

If the NO AIRFLOW LED on one of the power supplies lights, check that the airflow around the power supply is sufficient.

**Action** To check the airflow, use the following CLI command:

```
user@host> show chassis environment
```

**Sample Output** user@m40-host> show chassis environment

```
Class Item          Status  Measurement
Power Power Supply A    OK
      Power Supply B    Absent

[...Output truncated...]
Fans  Top Impeller      OK      Spinning at normal speed
      Bottom Impeller   OK      Spinning at normal speed
      Rear Fan 1        OK      Spinning at normal speed
      Rear Fan 2        OK      Spinning at normal speed
      Rear Fan 3        OK      Spinning at normal speed
```

[...Output truncated...]

**What It Means** The command output displays the power supply status and the cooling system status. When monitoring the power supplies, look at both the power supply status and the cooling system status. If the cooling system temperature is above a certain level, the power supplies are automatically cut off.

**Alternative Action** To check the power supply temperature on M40e and M160 routers, use the following CLI command:

```
user@host> show chassis environment pem
```

```
user@host> show chassis environment pem
```

```
PEM 0 status:
State          Online
Temperature     OK
DC input        OK
DC output       OK
Load            Less than 20 percent
Voltage:
48.0 V input    69028 mV
48.0 V fan supply 48839 mV
5.0 V bias      5013 mV
8.0 V bias      8253 mV
PEM 1 status:
State          Online
Temperature     OK
DC input        OK
DC output       OK
Load            Less than 20 percent
Voltage:
48.0 V input    69307 mV
48.0 V fan supply 49170 mV
5.0 V bias      4991 mV
8.0 V bias      8263 mV
```



The command output displays the temperature of the air flowing past the power supplies (PEMs). The status is either OK or Failed.

To check the status of a specific power supply, indicate the slot number. For example, type `show chassis environment pem slot`, where *slot* can be either 0 or 1.

### Step 5: Test the Power Supply

**Action** On certain power supplies (M5/M10, M40e, and M160 routers), a self-test button is used to test the power supply. It is located beneath the power supply LEDs. The self-test button is for use by qualified service personnel only.

## Getting Power Supply Hardware Information

---

**Steps To Take** To get the power supply hardware information, follow these steps:

1. Display the Power Supply Hardware Information on page 242
2. Locate the Power Supply Serial Number ID Label on page 242

### Step 1: Display the Power Supply Hardware Information

**Action** To display power supply hardware information, use the following CLI command:

```
user@host> show chassis hardware
```

**Sample Output** For M5, M10, M20, M40, and M40e routers:

```
user@host> show chassis hardware
Hardware inventory:
Item      Version  Part number  Serial number  Description
Chassis                2003         M20
Backplane    REV 07  710-001517  AA7940
Power Supply A  Rev 02  740-001465  000497      AC
Power Supply B  Rev 01  740-001465  000001      AC
[...Output truncated...]
```

For M160 and T320 routers and T640 routing nodes:

```
user@host> show chassis hardware
Item      Version  Part number  Serial number  Description
Chassis                47          M160
Midplane    REV 02  710-001245  AB4113
FPM CMB      REV 01  710-001642  AA9721
FPM Display  REV 01  710-001647  AA2995
CIP          REV 02  710-001593  AA9886
PEM 0        Rev 01  740-001243  KJ35782      DC
PEM 1        Rev 01  740-001243  kj35756      DC
[...Output truncated...]
```

**What It Means** For all routers except the M160 and T320 routers and the T640 routing node, the command output displays the power supply slot number, revision level, part number, serial number, and the power supply type. When facing the back of the router, power supply A is located on the right and power supply B is located on the left.

For the M160 and T320 routers and the T640 routing node, the command output displays the power supply or PEM slot number, revision level, part number, serial number, and power supply type. When facing the back of the router, PEM 0 is located on the right and PEM 1 is located on the left.

## **Step 2: Locate the Power Supply Serial Number ID Label**

**Action** To locate the power supply serial number ID label, see Table 66 and Figure 95 on page 243 through Figure 101 on page 248.

**Table 66: Power Supply Serial Number ID Label Locations on M-series Routers**

Router	Power Supply Type	Serial Number ID Label Location
M5 and M10	AC, DC	Power supply faceplate
M7i and M10i	AC, DC	Power supply faceplate
M20	AC, DC	Right side of the power supply back
M40	AC, DC	Top of the power supply
M40e	AC	Upper center of the power supply faceplate
	DC	Left center of the power supply faceplate
M160	DC	Left center of the power supply faceplate
M320	AC, DC	On the power supply faceplate under the circuit breaker switch
T320 and T640	DC	Left side of the power supply faceplate

Figure 95 shows the location of the serial number ID label on the power supplies for the M5 and M10 routers. The label is located on the power supply faceplate.

Figure 95: M5 and M10 Router Power Supply Serial Number ID Label

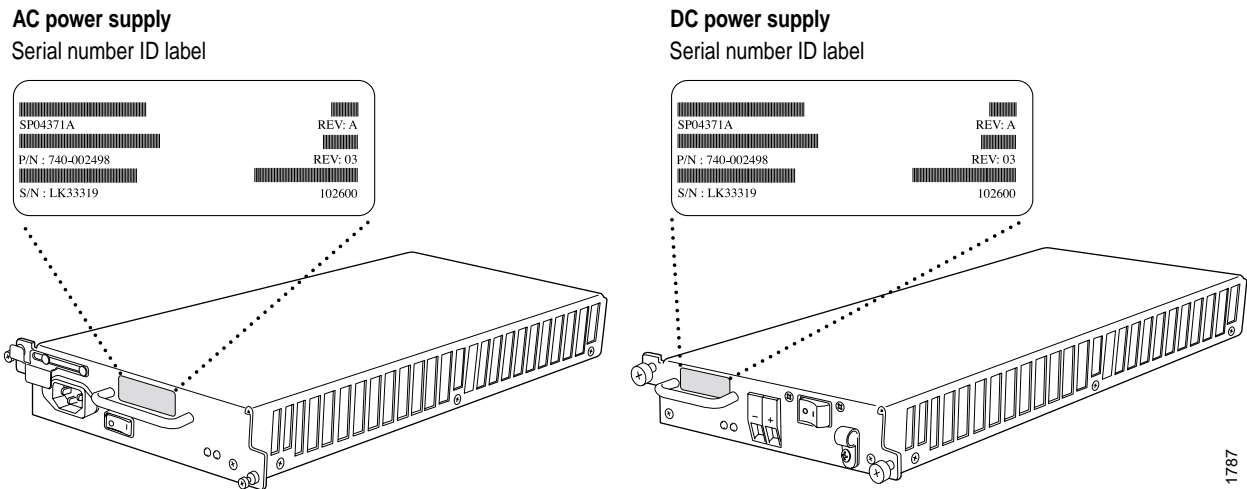


Figure 96 shows the location of the power supply serial number ID label. for the M7i router. The label is located on the power supply faceplate.

Figure 96: M7i Router Power Supply Serial Number ID Label

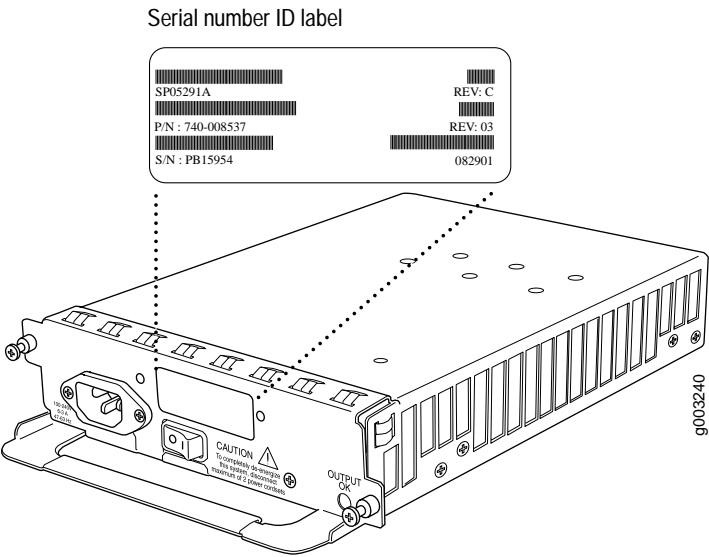


Figure 97 shows the location of the AC and DC power supply serial number ID labels for the M10i router. The labels are located on the power supply faceplate.

**Figure 97: M10i Router Power Supply Serial Number ID Labels**

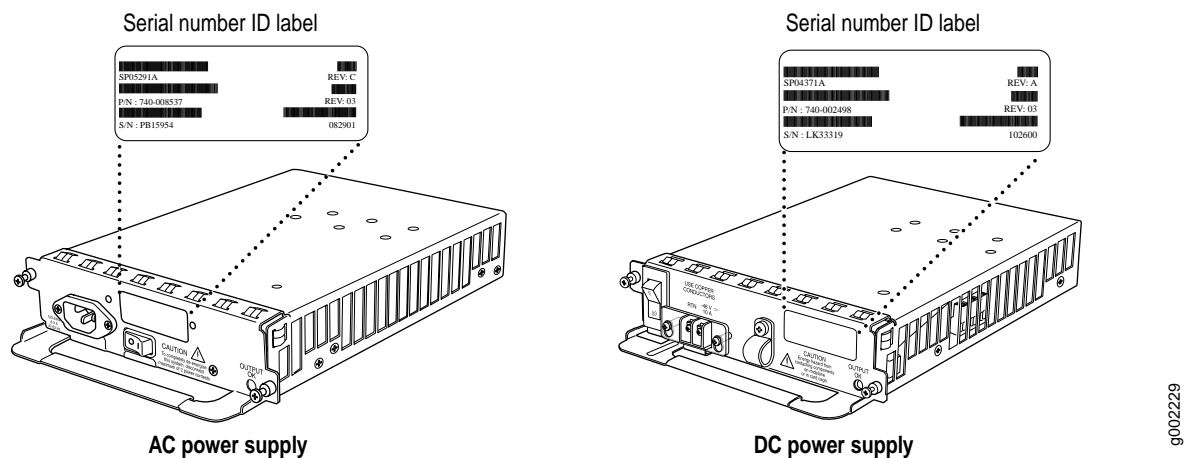


Figure 98 shows the location of the serial number ID label on the power supplies for an M20 router. The label is located on the right side on the back of the power supply.

**Figure 98: M20 Router Power Supply Serial Number ID Label**

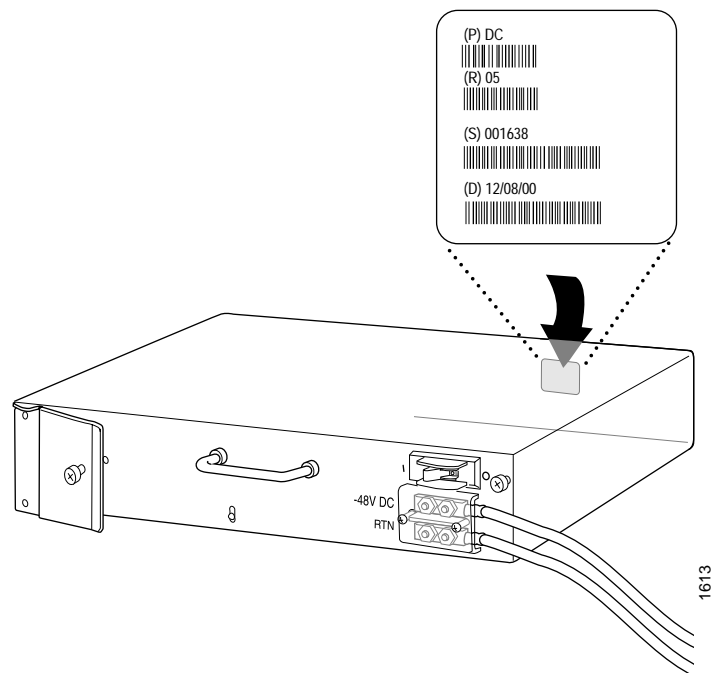


Figure 99 shows the location of the serial number ID label on the power supply for an M40 router. The label is located on the top of the power supply.

Figure 99: M40 Router Power Supply Serial Number ID Label

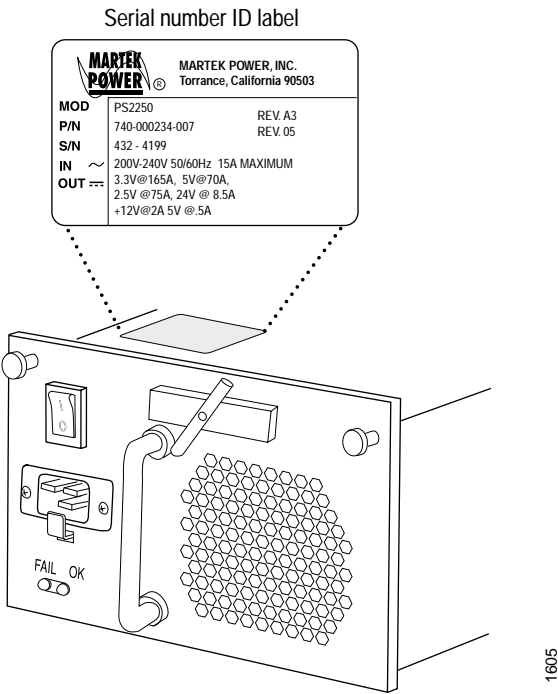


Figure 100 shows the location of the AC power supply serial number ID label for an M40e router. The label is located at the upper center of the faceplate.

**Figure 100: M40e Router AC Power Supply Serial Number ID Label**

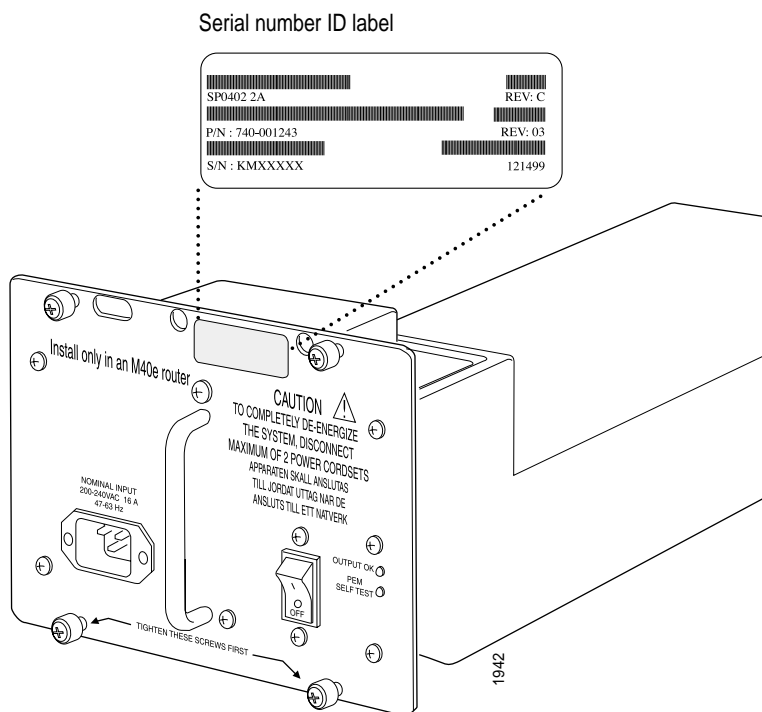


Figure 101 shows the location of the DC power supply serial number ID label for the M40e and M160 routers. The label is located on the faceplate.

**Figure 101: M40e and M160 Router DC Power Supply Serial Number ID Label**

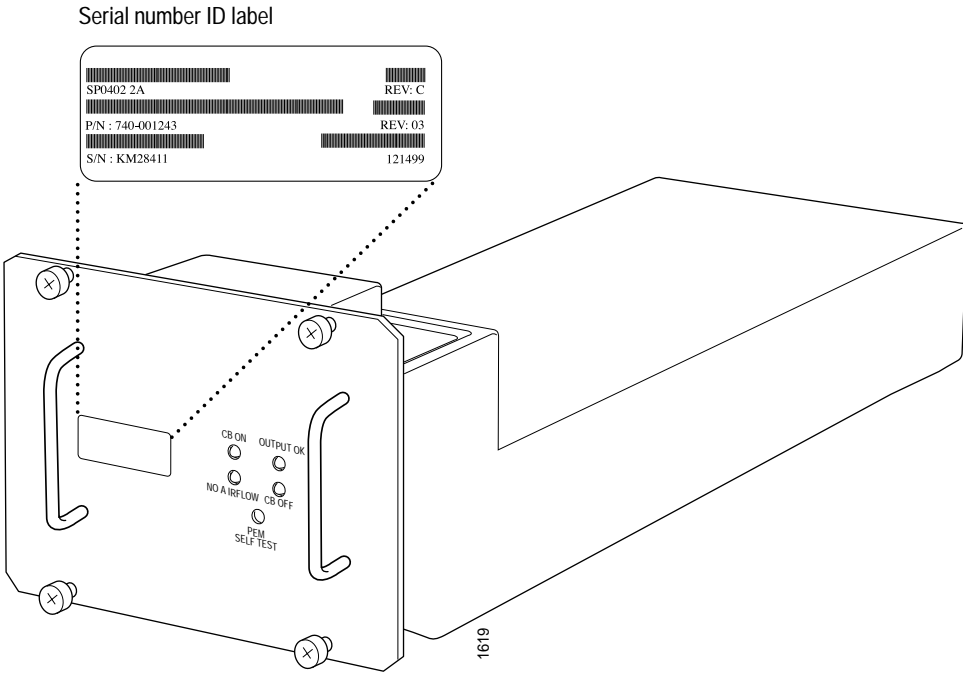


Figure 102 shows the location of the AC and DC power supply serial number ID labels for the M320 router. The serial number ID label is located on the power supply faceplate under the circuit breaker switch.

**Figure 102: M320 Router AC and DC Power Supply Serial Number ID Label**

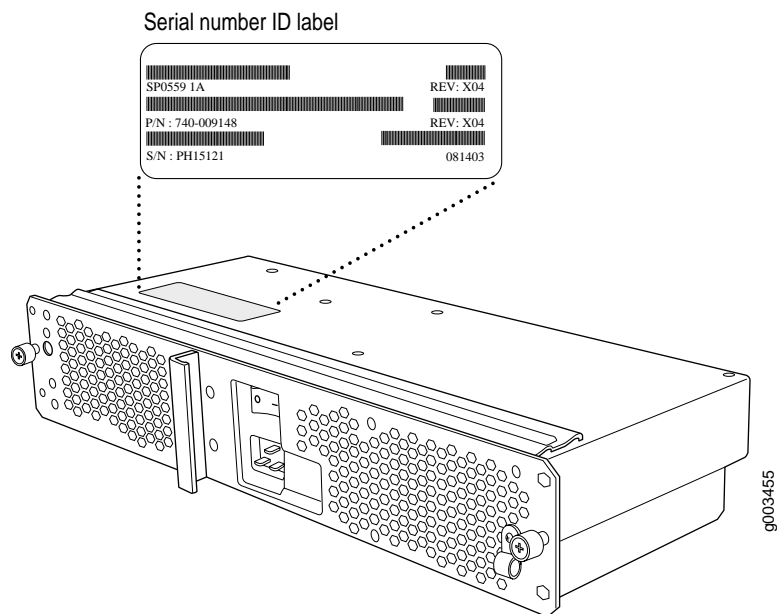


Figure 103 shows the location of the DC power supply serial number ID label for the T320 router. The serial number ID label is located on the left side of the power supply faceplate.

**Figure 103: T320 Router DC Power Supply Serial Number ID Label**

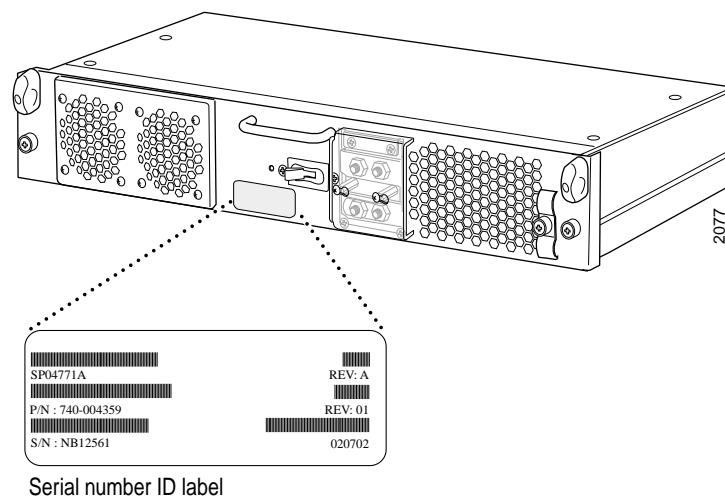
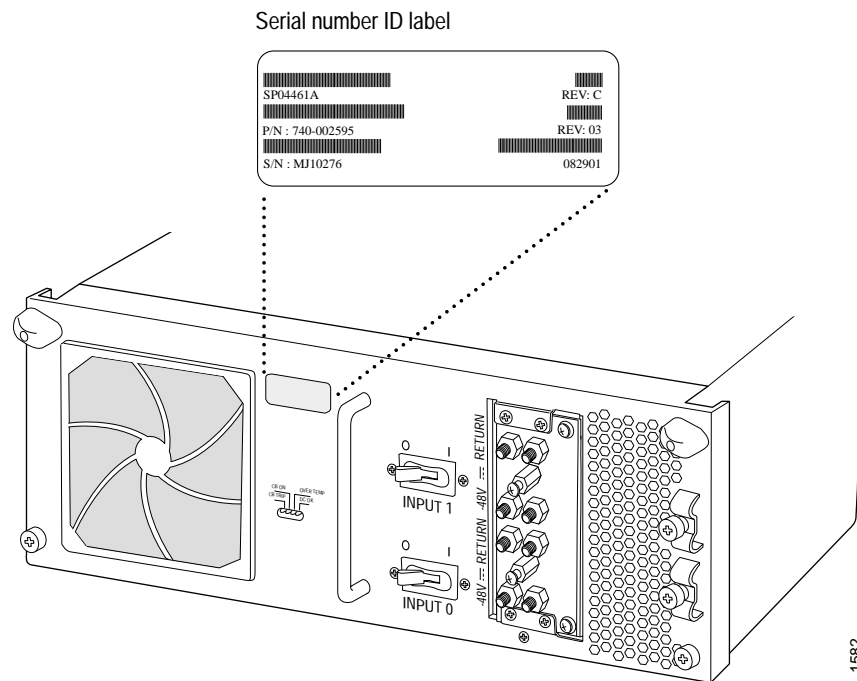




Figure 104 shows the location of the DC power supply serial number ID label for the T640 routing node. The serial number ID label is located on the left side of the power supply faceplate.

**Figure 104: T640 Routing Node DC Power Supply Serial Number Label**



## Replacing the Power Supplies

The power supplies are hot-removable and hot-insertable. You can remove or replace a power supply without powering down the system and disrupting routing functions.

However, you must power down the power supply before removing it from the router. When one power supply is powered down, the other power supply automatically assumes the entire electrical load for the router.



**NOTE:** The circuit breaker box is not hot-removable or hot-pluggable. You must power down the router to remove the circuit breaker box.

**Action** To return a failed power supply, see “Return the Failed Component” on page 86. To replace the power supplies, see the appropriate router hardware guide.

