

# MODULUS 21

## Power Distribution Unit (PDU) Replacement

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### Overview

#### Introduction

This notice explains how to replace the AC **Power Distribution Unit (PDU)**, also known as a Power Distribution Assembly (PDA), in a Modulus 21 enclosure.

This notice assumes familiarity with Modulus 21-mounted products and the Modulus 21 itself. Your configuration may vary from the examples shown here.

#### Additional Information

For details, refer to your device documentation, and to the *Modulus 9 and 21 Installation and Operation Guide* (Part No. 09564).

#### In This Manual

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#### PDU Kit Contents

The PDU replacement kit includes:

- PDU hardware
- PDU replacement label
- This document

If your kit is incomplete, contact Motorola ISG Customer Support.



## Overview

### Modulus 21 Serial Numbers Affected

This notice refers *only* to replacing PDU's in Modulus 21's whose serial number is one of the following. (For serial-number label location, refer to Figure 5, L.)

- 3494
- 5043
- 285000 - 330000 (range)
- 549998 - 600000
- 890000 - 893000
- 915000 - 999999
- 2026000 - 9000000
- 9400000 - 32220000
- 6009568007
- 10052388-8
- 890000A - 999999A
- 890000B - 999999B
- 890000D - 999999D
- 3150000A - 3300000A
- 3100000B - 3300000B
- 3100000R - 3300000R
- 890100DM - 890200DM



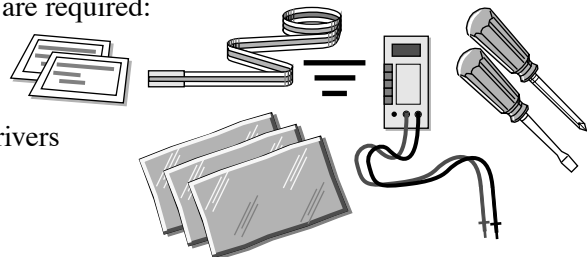
### Warning!

Only **qualified Service personnel** should perform this procedure. Use of the procedure by unqualified personnel could result in **personal injury** or **equipment damage**, which could jeopardize your warranty and maintenance agreement.

### Tools Needed

The following tools and supplies are required:

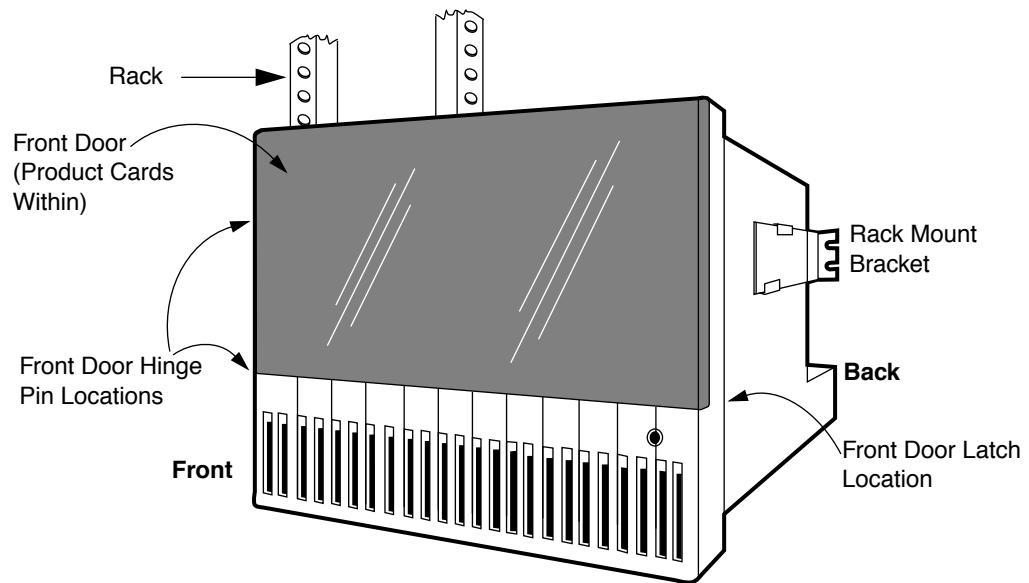
- Grounding wrist strap
- Labels
- Flat- and Phillips- head screwdrivers
- Anti-static plastic bags
- Multi-meter



## Modulus 21 Enclosure Overview

### Overview

This section explains how Motorola products are contained in Modulus 21 enclosures (Figure 1) and equipment racks.



**Figure 1. Modulus 21 Enclosure**

### Product Cards

A Modulus 21 enclosure provides common housing and power for plug-in **card versions** of Motorola products, such as 35XX DSU/CSUs, 326X dial modems, 33XX leased-line modems, and 6500 nodes.

### Enclosures

The Modulus 21 enclosure accommodates product cards in its 21 **slots**. It can hold two or three independent **power supply modules**, and one **power distribution unit (PDU)**.

### Backplanes

The Modulus 21 can contain one or more product-specific **backplanes** to carry the signal and data flow between product cards and the external environment, and to provide cable connections to product cards.

### Equipment Racks

A standard 19-inch **equipment rack** can hold Modulus 21's and other units.

## Removing Product Cards from a Modulus 21

### Overview

This section explains how to remove product cards from a Modulus 21 enclosure.

### Card Removal

Remove product cards and filler panels from the Modulus 21 enclosure as follows.

#### ■ IMPORTANT

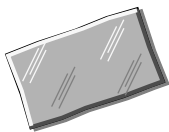
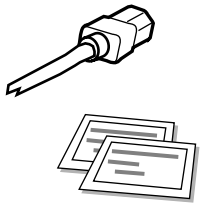
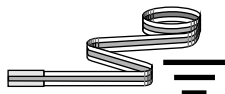
*This procedure **removes power** from all devices in the Modulus 21. Before you begin, plan for the effects on your network functions and users.*



### Warning!

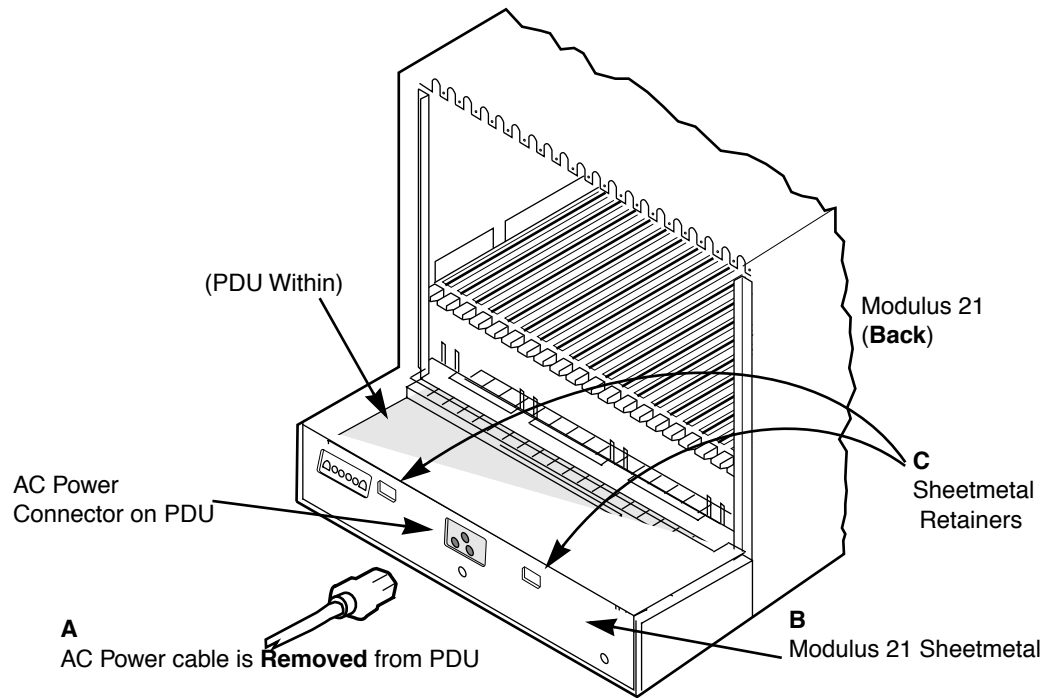
Before you begin, unplug the AC power cord from the power source.

### Removing Product Cards from a Modulus 21 Enclosure

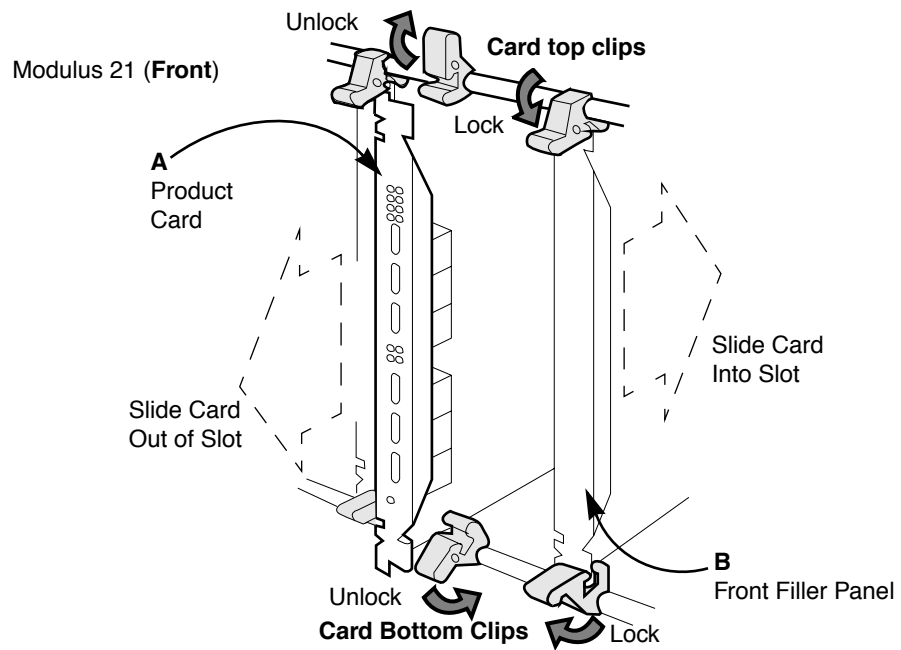


| Step | Action   | Result  |
|------|--|---|
| 1    | Attach a grounding wrist strap to yourself and a grounded object.  | Any electrostatic energy is discharged from you.                    |
| 2    | <b>Unplug</b> both ends of the AC power cable (Figure 2, <b>A</b> ) from the PDU.  | Power is removed from the Modulus 21 and the devices in it.         |
| 3    | Open the Modulus 21 front door. From the front and back of the Modulus 21, label each product card and cable connector. Label each backplane's location.                               | Card, cable, and backplane locations and connections are labelled.  |
| 4    | Detach the cable connectors from the backplane(s) (Figure 5, <b>B</b> ).   | Cables are disconnected.  |
| 5    | Remove a product card (Figure 3, <b>A</b> ) by pressing its top and bottom clips apart and pulling it from the slot. Put the card in an anti-static bag. Repeat for each product card. | Cards are removed from Modulus 21. Cards are protected from damage. |

**Removing Product Cards from a Modulus 21**



**Figure 2. Unplugging AC Power Cord from Back of Modulus 21**

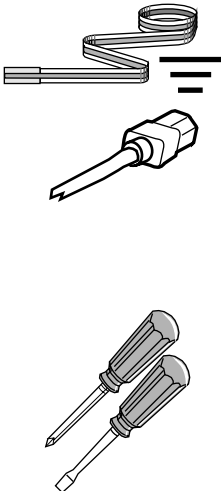


**Figure 3. Removing/Installing Product Cards in Modulus 21 Slots**

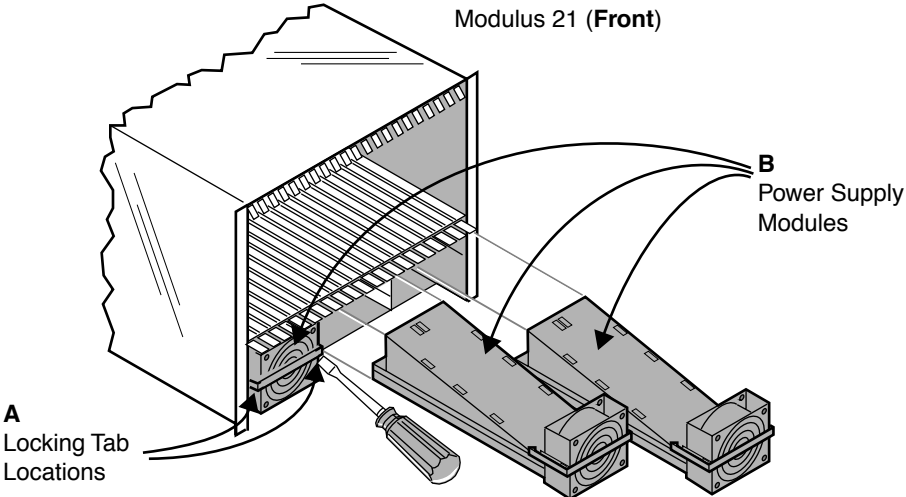
# Removing Power Supply Modules from a Modulus 21

**Overview** This section explains how to remove a power supply module from a Modulus 21.

## Removing a Power Supply Module From a Modulus 21



| Step | Action   | Result  |
|------|--|---|
| 1    | Ensure that you are wearing a grounding wrist strap and that the AC power cable is <b>disconnected</b> from the PDU (Figure 5, A).   | Any electrostatic energy is discharged from you.<br>Power is removed from the Modulus 21 and the devices in it. |
| 2    | With the Modulus 21 front door open, squeeze the two front door hinge pins (Figure 1) toward each other until the pins are free. Remove the front door.  | Modulus 21 front door is removed.   |
| 3    | Insert a flat-blade screwdriver into each of a power supply's two locking tabs (Figure 4, A). Gently turn the screwdriver until the tab clicks.<br>Pull the power supply module (Figure 4, B) from the Modulus 21. |   |
| 4    | Repeat for each power supply module.   | Power supply modules are removed from the Modulus 21.   |



**Figure 4. Removing Power Supply Modules From Modulus 21**

# Removing a Modulus 21 Enclosure From a Rack

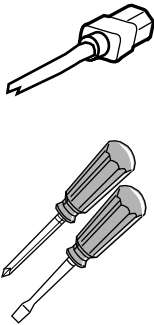
This section explains how to remove the Modulus 21 enclosure from a rack.



## Warning!

The Modulus 21 enclosure is heavy. To avoid injury, *two people* should remove it.

### Removing a Modulus 21 Enclosure from a Rack



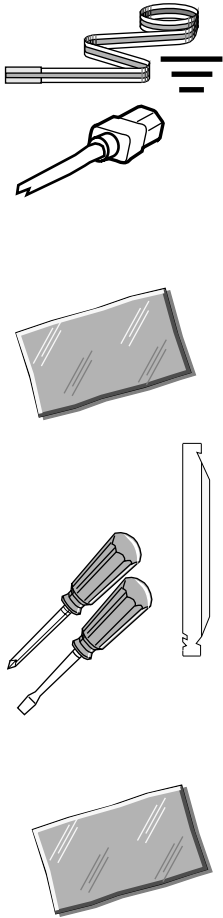
| <b>Step</b> | <b>Action</b>   | <b>Result</b>   |
|-------------|---|---|
| <b>1</b>    | Ensure that the AC power cable is <b>disconnected</b> from the PDU (Figure 5, A).                 | Power is removed from the Modulus 21 and the devices in it. |
| <b>2</b>    | Position one person in front of the Modulus 21 and one at the back.                               |   |
| <b>3</b>    | Hold the Modulus 21 in place in the rack while removing the rack mount bracket screws (Figure 1). |   |
| <b>4</b>    | Carefully slide the Modulus 21 out of the front of the rack.                                      | Modulus 21 is removed from rack.                            |

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# Removing Backplane(s) and the PDU from a Modulus 21

This section explains how to remove backplanes and the PDU from a Modulus 21.

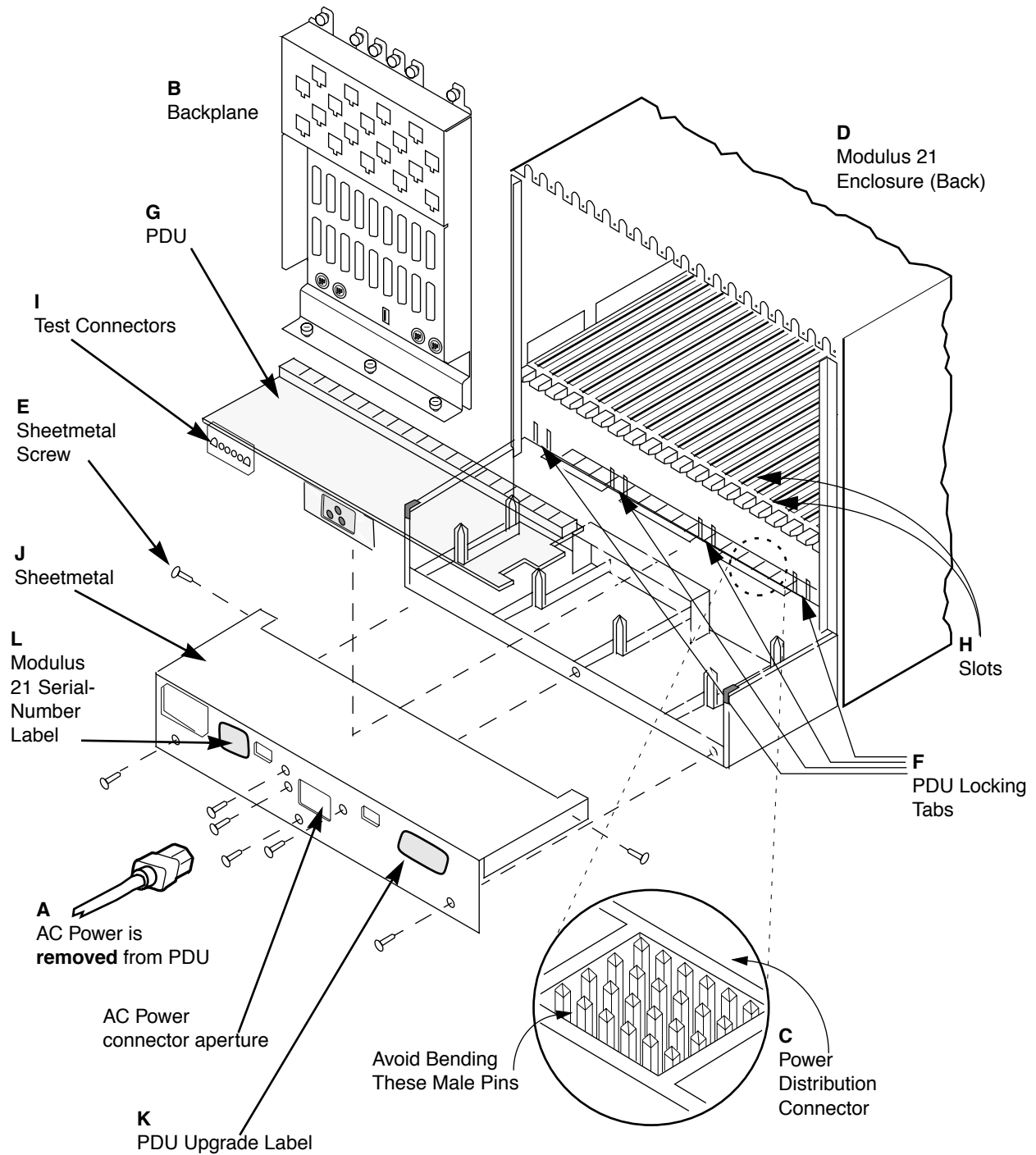
## Removing Product Backplanes and the PDU From a Modulus 21 Enclosure



| Step | Action   | Result  |
|------|--|---|
| 1    | Ensure that you are wearing a grounding wrist strap and that the AC power cable is <b>disconnected</b> from the PDU (Figure 5, A).   | Any electrostatic energy is discharged from you.<br>Power is removed from the Modulus 21 and the devices in it. |
| 2    | From the back of the Modulus 21, loosen a backplane's top and bottom screws (Figure 5, B). Push the backplane <i>vertically</i> , very slightly, to disconnect it from the power distribution connector (Figure 5, C). Tilt the top of the backplane away from the Modulus 21 (Figure 5, D), and remove it. Put the backplane in an anti-static bag. |   |
| 3    | Repeat for each backplane.   | Backplanes are removed from the enclosure.  |
| 4    | Remove any back filler panels from unused slots.   |   |
| 5    | From the back of the Modulus 21, remove the sheetmetal screws (Figure 5, E); there are six of one size and two of another. Remove the sheetmetal.  | Sheetmetal is removed from the Modulus 21.  |
| 6    | Press forward on each of the four PDU locking tabs (Figure 5, F) to unlock them.<br>Pull the PDU (Figure 5, G) out. Set it aside for return to Motorola ISG, as described in a later section.  | PDU is removed from the Modulus 21.   |



**Removing Backplane(s) and the PDU from a Modulus 21**

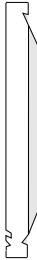
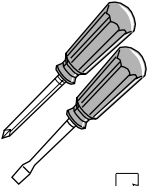
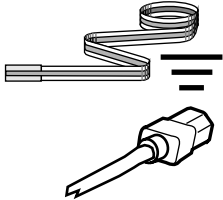


**Figure 5. Removing Backplane(s) and PDU from a Modulus 21**

# Replacing a PDU and Backplane(s) in a Modulus 21

This section explains how to install a PDU and backplane(s) in a Modulus 21.

## Replacing a Power Distribution Unit (PDU) and Backplane(s) in a Modulus 21



PDU p/n: 65524 G01  
 Artwork Rev: **B**  
 Assembly Rev: **C**

| <b>Step</b> | <b>Action</b>   | <b>Result</b>   |
|-------------|---|---|
| <b>1</b>    | Ensure that you are wearing a grounding wrist strap and that the AC power cable (Figure 5, <b>A</b> ) is <b>disconnected</b> from the PDU.  | Any electrostatic energy is discharged from you.<br>Power is removed from the Modulus 21 and the devices in it. |
| <b>2</b>    | From the back of the Modulus 21, slide the PDU (Figure 5, <b>G</b> ) into its slots, then press down on it, so that all four locking tabs (Figure 5, <b>F</b> ) lock.                                       | PDU is installed in the Modulus 21.   |
| <b>3</b>    | Slide the sheetmetal into place while pressing its two retainers (Figure 2, <b>C</b> ) with your thumbs. Install the sheetmetal screws (Figure 5, <b>E</b> ); there are six of one size and two of another. | Sheetmetal is installed in the Modulus 21.  |
| <b>4</b>    | Re-install a backplane by pressing it down and into the power distribution connectors (Figure 5, <b>C</b> ). Ensure that the backplane is seated firmly in the connectors.                                  |   |
| <b>5</b>    | Repeat for each backplane.  | Backplanes are re-installed in the Modulus 21.  |
| <b>6</b>    | Replace any back filler panels in unused slots (Figure 5, <b>H</b> ).   |   |
| <b>7</b>    | Tighten all backplane screws.   |   |
| <b>8</b>    | Attach the PDU upgrade label (Figure 5, <b>K</b> ) to the Modulus 21 sheetmetal (Figure 5, <b>J</b> ).  | Modulus 21 is labelled to confirm PDU upgrade.  |

# Replacing a Modulus 21 in a Rack

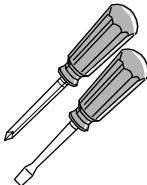
This section explains how to install a Modulus 21 in a rack.



## Warning!

The Modulus 21 enclosure is heavy. To avoid injury, *two people* should install it.

### Installing a Modulus 21 Enclosure in a Rack



| <b>Step</b> | <b>Action</b>   | <b>Result</b>                                  |
|-------------|---|--|
| <b>1</b>    | Position one person in front of the Modulus 21 and one at the back.   |  |
| <b>2</b>    | Carefully slide the Modulus 21 into the front of the rack.  |  |
| <b>3</b>    | Hold the Modulus 21 in place in the rack while installing the screws in the rack mount brackets (Figure 1). | Modulus 21 enclosure is installed in the rack. |

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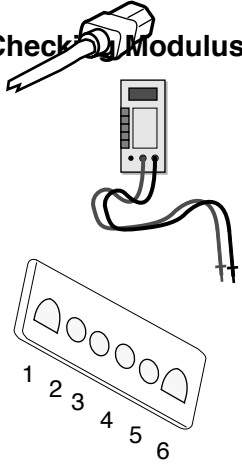
# Checking Modulus 21 Resistance



**Overview**

This section explains how to check the Modulus 21 electrical resistance.

**Check Modulus 21 Resistance**



| Step | Action  | Result   |
|------|---|--|
| 1    | Ensure that you are wearing a grounding wrist strap and that the AC power cable is <b>disconnected</b> from the PDU (Figure 5, A).  | Any electrostatic energy is discharged from you.<br>Power is removed from the Modulus 21 and the devices in it.  |
| 2    | Set a multi-meter to a minimum 20-Ω range. On the PDU, measure the resistance between pairs of test connector pins (Figure 5, I).<br>Readings should be ∞ Ω, as shown in Table 2. | <ul style="list-style-type: none"> <li>If any pair registers resistance, the backplane connectors are short-circuited. Remove the product backplane (as explained above), and carefully straighten any bent pins on the PDU. If a pair still registers resistance, repeat the entire PDU replacement procedure.<br/>If you cannot resolve the problem, contact Motorola Customer Support.</li> <li>If all pairs register as open circuits, the backplane circuits are OK.</li> </ul> |

**Table 1. Resistance Check—Pin Connections**

| Measure From This Pin... |             | To This Pin... |             | To Obtain This Reading: |
|--------------------------|-------------|----------------|-------------|-------------------------|
| Number                   | Description | Number         | Description |                         |
| 1                        | Ground      | 4              | +5V         | ∞ Ω                     |
| 1                        | Ground      | 5              | +12V        | ∞ Ω                     |
| 1                        | Ground      | 6              | -12V        | ∞ Ω                     |
| 4                        | +5V         | 5              | +12V        | ∞ Ω                     |
| 4                        | +5V         | 6              | -12V        | ∞ Ω                     |
| 5                        | +12V        | 6              | -12V        | ∞ Ω                     |

# Re-installing Power Supply Modules in a Modulus 21



## Overview

This section explains how to re-install a power supply module in a Modulus 21.

## Installing Power Supply Modules in a Modulus 21 Enclosure

| <b>Step</b> | <b>Action</b>  | <b>Result</b>   |
|-------------|--|---|
| <b>1</b>    | Ensure that you are wearing a grounding wrist strap and that the AC power cable is <b>disconnected</b> from the PDU (Figure 5, <b>A</b> ). | Any electrostatic energy is discharged from you.<br>Power is removed from the Modulus 21 and the devices in it. |
| <b>2</b>    | Carefully slide a power supply module (Figure 4, <b>B</b> ) into the front of the Modulus 21.  | The tabs lock in place (Figure 4, <b>A</b> ).   |
| <b>3</b>    | Repeat for each power supply module.   | Power supply modules are replaced in the Modulus 21.  |

# Checking Modulus 21 Voltage

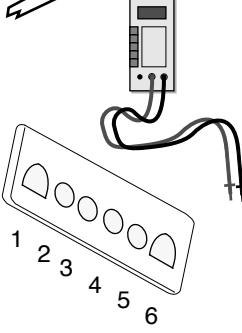


**Overview**

This section explains how to check the Modulus 21 electrical voltage.



**Checking Modulus 21 Voltage**



| Step | Action  | Result  |
|------|---|---|
| 1    | Ensure that you are wearing a grounding wrist strap.  | Any electrostatic energy is discharged from you.  |
| 2    | <b>Connect</b> the AC power cable to the PDU (Figure 5, A).   | Power is supplied to the Modulus 21 and the devices in it.  |
| 3    | Set a multi-meter to a DC voltage setting. On the PDU, measure the voltage between pairs of connector pins (Figure 5, I). Voltages should match those in Table 2. | <ul style="list-style-type: none"> <li>If any voltage reading is incorrect, immediately <b>disconnect</b> the AC power cord. Ensure that the power supplies are seated correctly, remove the backplane(s) as explained above, and carefully straighten any bent pins. Repeat Step 3. If you cannot resolve the problem, contact Motorola Customer Support.</li> <li>If all voltages are correct, the PDU is installed correctly.</li> </ul> |

**Table 2. Voltage Check—Pin Connections**

| <i>Measure From This Pin...</i> |                    | <i>To This Pin...</i> |                    | <i>To Obtain This Reading:</i> |
|---------------------------------|--------------------|-----------------------|--------------------|--------------------------------|
| <b>Number</b>                   | <b>Description</b> | <b>Number</b>         | <b>Description</b> |                                |
| 1                               | Ground             | 4                     | +5V                | +5V                            |
| 1                               | Ground             | 5                     | +12V               | +12V                           |
| 1                               | Ground             | 6                     | -12V               | -12V                           |

## Re-installing Product Cards in a Modulus 21



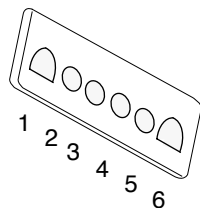
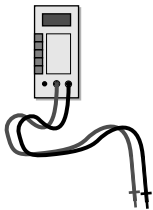
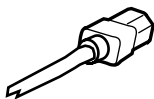
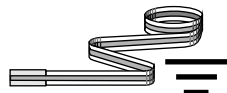
### Caution!

Before you begin, unplug the AC power cable from the power source.

### Card Installation

Re-install product cards and filler panels in the Modulus 21 enclosure as follows.

### Installing Product Cards in a Modulus 21 Enclosure



| Step | Action  | Result  |
|------|---|---|
| 1    | Ensure that you are wearing a grounding wrist strap.  | Any electrostatic energy is discharged from you.  |
| 2    | <b>Disconnect</b> the AC power cable from the Modulus 21 (Figure 2).  | Power is removed from the Modulus 21 and the devices in it.   |
| 3    | From the front of the Modulus 21, slide a product card into its labelled slot and seat it in its top and bottom clips (Figure 3).                                 |   |
| 4    | Repeat for each product card.   | Product cards are re-installed in Modulus 21.   |
| 5    | From the back of the Modulus 21, connect cables to backplane(s) according to their labelled locations.  | Cables are reconnected.   |
| 6    | Plug the AC power cable into the Modulus 21.  | Power is supplied to the Modulus 21 and the devices connected to it.  |
| 7    | Set a multi-meter to a DC voltage setting. On the PDU, measure the voltage between pairs of connector pins (Figure 5, I). Voltages should match those in Table 2. | <ul style="list-style-type: none"> <li>• If any voltage reading is incorrect, immediately <b>disconnect</b> the AC power cord. Ensure that the power supplies are seated correctly, remove the backplane(s) as explained above, and carefully straighten any bent pins. Repeat Step 3.</li> <li>• If you cannot resolve the problem, contact Motorola Customer Support.</li> <li>• If all voltages are correct, the product cards are installed correctly.</li> </ul> |

## Returning a PDU to Motorola ISG

This section explains how to prepare a PDU for return to Motorola ISG.

### Returning a PDU to Motorola ISG

| <b>Step</b> | <b>Action</b>   | <b>Result</b>  |
|-------------|---|--|
| <b>1</b>    | Attach the following information to the PDU: <ul style="list-style-type: none"> <li>• RMA # 062095000</li> <li>• Subsidiary name and location</li> <li>• Modulus 21 serial number</li> <li>• Customer name</li> </ul>   | PDU is identified for proper credit to your account. |
| <b>2</b>    | Put the PDU in a poly bag and carefully pack it in the package that the new PDU came in.  |  |
| <b>3</b>    | Mark the Equipment Return Authorization (ERA) number on the outside of the package. The ERA is on the replacement-PDU order acknowledgment.   |  |
| <b>4</b>    | If you are <i>in the U. S. A.</i> , ship the PDU to: <p style="margin-left: 40px;">             Modulus Project<br/>             Motorola ISG<br/>             11-A Norfolk Street<br/>             Mansfield, MA 02048 USA<br/>             Attn.: Roy Savill           </p> If you are <i>outside the U. S. A.</i> , ship the PDU to: <p style="margin-left: 40px;">             Modulus Project<br/>             Motorola ISG<br/>             Church Road<br/>             Lowfield Heath<br/>             Crawley, West Sussex<br/>             RH11 OPQ, Great Britain           </p> Motorola ISG recommends that you use a delivery company that offers proof-of-delivery. Return multiple PDU's in batches, one per month. | The PDU replacement procedure is complete.           |

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