# Instructions Manual

Tektronix

# PS280 and PS283 Power Supplies

**070-9894-01**

# Table of Contents

# PS280 and PS283 Power Supplies

The Tektronix PS280 and PS283 Laboratory DC Power Supplies are multifunction benchtop or portable instruments. These regulated triple output power supplies provide one fixed 5 V, 3 A output suitable for powering logic circuits and two variable 0 to 30 V outputs useful in a wide variety of test and experimental uses.

The current output of the PS280 varies from 0 to 2 A. The current output of the PS283 varies from 0 to 1 A. In all other respects, the instruments are identical. Unless otherwise noted, descriptions and procedures in this manual apply to both instruments.

The front panel switches provide three modes of operation for the PS280 and PS283 power supplies:

- Independent mode: the output voltage and current of each supply is controlled independently.
- Series mode: the variable outputs are connected in series and the controls of the MASTER power supply adjust the voltages or currents of both supplies. Series mode allows the supplies to vary from 0 to 60 V at 0 to 2 A for the PS280 and 0 to 60 V at 0 to 1 A for the PS283.
- Parallel mode: the variable outputs are connected in parallel and the controls of the MASTER power supply adjust the voltages or currents of both supplies. Parallel mode allows the supplies to vary from 0 to 4 A at 0 to 30 V for the PS280 and 0 to 2 A at 0 to 30 V for the PS283.

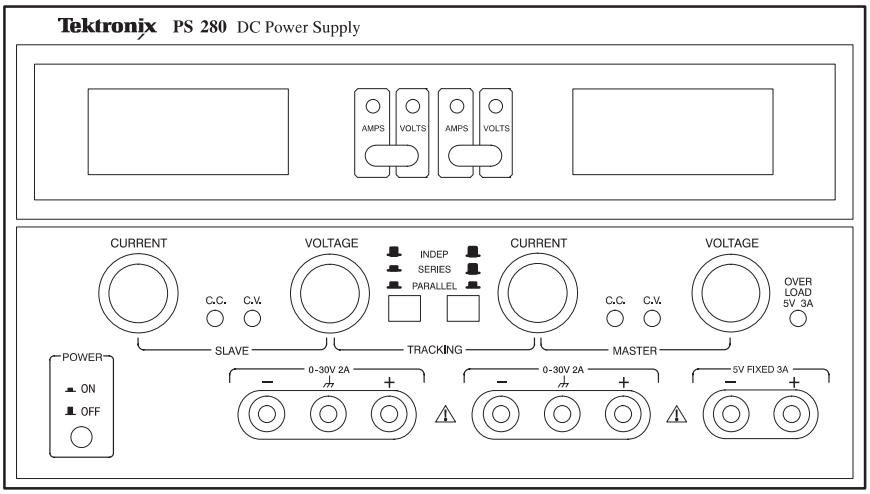


**Figure 1: PS280 DC Power Supply**

# PS280 and PS283 Specifications

The characteristics listed in this section apply under the following conditions:

- The instrument operates in a 0° to 40° C (32° to 104° F) ambient environment, unless otherwise noted.
- The instrument warms up for at least twenty minutes.

***NOTE.*** *All characteristics are warranted unless marked "typical". Typical characteristics are not guaranteed but are provided for the convenience of the user.*

**Table 1: Operational characteristics**

| Characteristic | Description |
|---|---|
| Outputs | One fixed 5 VDC, two variable 0 to 30 VDC |
| Voltage (5 V Fixed Supply) | 5.0 VDC ±0.25 VDC at 3.0 A maximum, foldback current limited |
| Voltage (0 to 30 V Supplies) | PS280: 0 to 30 VDC constant at 2.0 A constant, maximum<br>PS283: 0 to 30 VDC constant at 1.0 A constant, maximum |
| Line regulation | |
| 5 V | < 5 mV |
| CV | PS280: ≤ 0.01% + 3 mV<br>PS283: ≤ 0.01% + 5 mV |
| CC | ≤ 0.2% + 3 mA |
| Load regulation | |
| 5 V | ≤ 0.2% |
| CV | ≤ 0.01% + 3 mV (rating current ≤ 3 A)<br>≤ 0.01% + 5 mV (rating current > 3 A PS280)<br>≤ 300 mV (0 to 60 VDC single series tracking supply) |
| CC | ≤ 0.2% + 3 mA |

**Table 1: Operational characteristics (cont.)**

| Characteristic | Description |
|---|---|
| Ripple and Noise | |
| 5 V | ≤ 2 $mV_{RMS}$ |
| CV | 5 Hz to 1 MHz: ≤ 1 $mV_{RMS}$ |
| CC | ≤ 3 $mA_{RMS}$ |
| Temperature coefficient (CV) | ≤ 300 ppm/°C |
| Recovery time (CV) | ≤ 100 µs (time to recover after a 50% load change with 0.5 A minimum) |
| Tracking error (SLAVE) | ≤ 0.5% + 10 mV of the MASTER supply |
| Indicator | Two 3½ digit, 0.5 inch LED panel displays |
| Meter indicators | 0 to 30 VDC ±(0.5% of RDG + 2 digits)<br>0 to 2 A ±(0.5% of RDG + 2 digits) |
| Insulation | |
| Chassis to terminals | ≥ 20 MΩ at 500 VDC |
| Chassis to AC cord | ≥ 30 MΩ at 500 VDC |

**Table 2: Electrical characteristics**

| Characteristic | Description |
|---|---|
| Line Voltage | 90 to 110, 108 to 132, 198 to 242, and 216 to 250 VAC |
| Line Frequency | 50 to 60 Hz |
| Power Consumption | PS280: 348 VA, 250 W maximum<br>PS282: 254 VA, 172 W maximum |

**Table 3: Environmental characteristics**

| Characteristic | Description |
|---|---|
| Operating Temperature | 0° to 40° C (32° to 104° F), ≤ 70% relative humidity |
| Nonoperating Temperature | –10° to +70° C (14° to 158° F), ≤ 80% relative humidity |

**Table 4: Physical characteristics**

| Characteristic | Description |
|---|---|
| Width | 255 mm (10.04 inch) |
| Height | 145 mm (5.71 inch) |
| Depth | 335 mm (13.19 inch) |
| Weight | PS280: 11.5 kg (25.3 lb)<br>PS283: 9.0 kg (19.8 lb) |

# PS280 and PS283 Performance Verification

This section contains procedures to verify that PS280 or PS283 power supplies perform as warranted. Implement the performance verification procedures whenever the accuracy or function of your instrument is in question.

The performance verification procedures provide a valid confirmation of instrument electrical characteristics and function under the following conditions:

- The instrument operates in a 20° to 30° C (68° to 104° F) ambient environment.
- The instrument warms up for at least 20 minutes before the verification begins.
- The cabinet remains installed on the instrument.

The PS280 and PS283 performance verification consists of the checks listed in Table 5.

**Table 5: Performance verification checks**

| |
|---|
| Constant Current Load Regulation Check |
| MASTER Current Regulation (INDEP mode) |
| SLAVE Current Regulation (INDEP mode) |
| MASTER Current Regulation (PARALLEL mode) |
| Constant Current Ripple and Noise Check |
| MASTER Current Ripple |
| SLAVE Current Ripple |
| Constant Voltage Regulation Check |
| MASTER Voltage Regulation |
| SLAVE Voltage Regulation |
| 5 V Fixed Voltage Regulation |

The performance verification procedure should be performed annually or after every 2000 hours of operation if used infrequently.

## Test Equipment

The performance verification procedures use external traceable test equipment to directly check warranted characteristics.

Alternative test equipment must meet or exceed the intended minimum requirements. If you substitute equipment, you may need to modify the performance verification procedures.

***NOTE**. Before beginning the performance verification procedures, warm up the test equipment according to the manufacturer's recommendations.*

**Table 6: Performance verification and adjustment test equipment**

| Description | Minimum requirements | Example product |
|---|---|---|
| Oscilloscope | 50 MHz, 3% vertical deflection accuracy | Tektronix TDS300 Series Oscilloscope |
| Digital Multimeter | 35 V, 4 A, ±0.1% Accuracy | Tektronix DMM914 Digital Multimeter |
| Fixed Resistive Loads | 20 Ω 30 W<br>10 Ω 30 W<br>2 Ω 5 W<br>1 Ω 30 W<br>7 Ω 140 W<br>0.5 Ω 5 W<br>15 Ω 70 W<br>30 Ω 140 W<br>7.5 Ω 140 W<br>30 Ω 40 W<br>60 Ω 70 W | |
| Variable Resistive Load | 0 to 2 Ω 30 W | |
| Shorting Strap with Alligator Clips | Insulated | |

## Constant Current Load Regulation Check

To check the constant current load regulation of your power supply, perform the following tests.

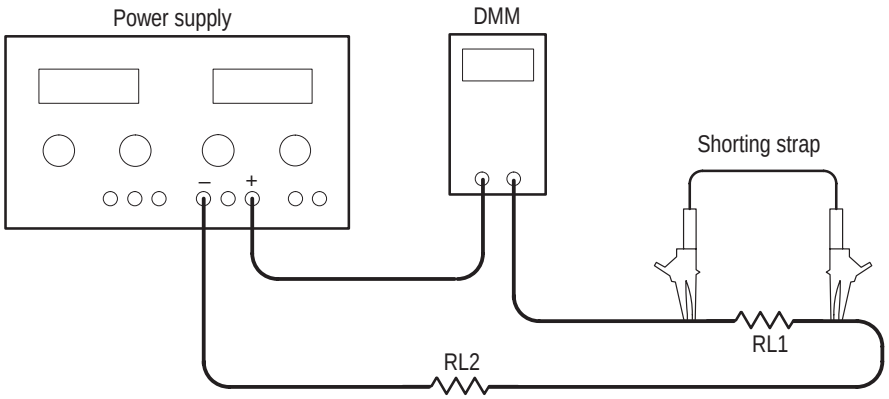


**Figure 2: Constant current test setup**

### MASTER Current Regulation (INDEP mode)

The following check verifies the INDEP mode MASTER current regulation performance.

1. Set the power supply to the INDEP operating mode by disengaging both TRACKING mode switches (both switches out).
2. Set the power supply MASTER AMPS/VOLTS selection switch to AMPS.
3. Set up the digital multimeter to measure 25 VDC.
4. Connect the digital multimeter to the + and – terminals of the power supply MASTER output.
5. Adjust the power supply MASTER VOLTAGE control until the multimeter reads 25 VDC.
6. Disconnect the digital multimeter from the power supply.
7. Set the digital multimeter to measure a DC current of at least 1 A (PS280) or 0.5 A (PS283).
8. Connect the digital multimeter and load resistors to the + and – terminals of the power supply MASTER output as shown in Figure 2. See Table 7 for the appropriate load resistor values.
9. Verify that the power supply output current varies less than 0.2% ±3 mA while shunting load resistor RL1 with the shorting strap. See Figure 2 above.

**Table 7: Load resistor values for current checks**

| | PS280 | | PS283 | |
|---|---|---|---|---|
| **Mode** | **RL1** | **RL2** | **RL1** | **RL2** |
| INDEP | 20 Ω, 30 W | 2 Ω, 5 W | 20 Ω, 30 W | 2 Ω, 5 W |
| PARALLEL | 10 Ω, 30 W | 1 Ω, 30 W | 10 Ω, 30 W | 1 Ω, 30 W |

### SLAVE Current Regulation (INDEP Mode)

The following check verifies the INDEP mode SLAVE current regulation performance.

1. Set the power supply SLAVE AMPS/VOLTS meter selection switch to AMPS.
2. Set up the digital multimeter to measure 25 VDC.
3. Connect the digital multimeter to the + and – terminals of the power supply SLAVE output.
4. Adjust the power supply SLAVE VOLTAGE control until the multimeter reads 25 VDC.
5. Disconnect the digital multimeter from the power supply.
6. Set the digital multimeter to measure a DC current of at least 1 A (PS280) or 0.5 A (PS283).
7. Connect the digital multimeter and load resistors to the + and – terminals of the power supply SLAVE output as shown in Figure 2. See Table 7 for the appropriate load resistor values.
8. Verify that the power supply output current varies less than 0.2% ±3 mA while shunting load resistor RL1 with the shorting strap. See Figure 2 above.

### MASTER Current Regulation (PARALLEL Mode)

The following check verifies the PARALLEL mode MASTER current regulation performance.

1. Set the power supply to the PARALLEL operating mode by engaging both TRACKING mode switches (both switches in).
2. Set up the digital multimeter to measure 25 VDC.
3. Connect the digital multimeter to the + and – terminals of the power supply MASTER output.
4. Adjust the power supply MASTER VOLTAGE control until the digital multimeter reads 25 VDC.
5. Disconnect the digital multimeter from the power supply.

6. Set the digital multimeter to measure a DC current of at least 1 A (PS280) or 0.5 A (PS283).
7. Connect the digital multimeter and load resistors to the + and – terminals of the power supply MASTER output as shown in Figure 2. See Table 7 for the appropriate load resistor values.
8. Verify that the power supply output current varies less than 0.2% ±5 mA while shunting load resistor RL1 with the shorting strap. See Figure 2 above.

## Constant Current Ripple and Noise Check

To check the constant current ripple and noise performance of your power supply, perform the following tests.

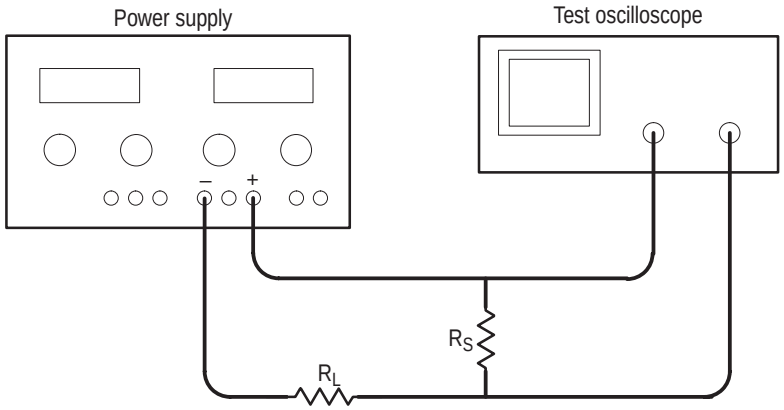


**Figure 3: Constant current ripple and noise test setup**

### MASTER Current Ripple

The following check verifies the MASTER current ripple.

1. Set the power supply to the INDEP operating mode by disengaging both TRACKING switches (both switches out).
2. Set the power supply MASTER AMPS/VOLTS meter selection switch to VOLTS.
3. Set the power supply to 25 VDC using the digital display.
4. Connect the test oscilloscope and load resistors to the + and – terminals of the MASTER output as shown in Figure 3. See Table 8 for the appropriate load resistor values.
5. Verify that the peak-to-peak ripple viewed on the oscilloscope is less than 3 mV.

6. Set the power supply to the PARALLEL operating mode by engaging both TRACKING mode switches (both switches in).
7. Verify that the peak-to-peak ripple viewed on the oscilloscope is less than 2.5 mV.
8. Set the power supply to the SERIES operating mode by disengaging the right TRACKING mode switch (switch out).
9. Verify that the peak-to-peak ripple viewed on the oscilloscope is less than 5 mV.

**Table 8: Load resistor values for ripple checks**

| | PS280 | | PS283 | |
|---|---|---|---|---|
| Mode | $R_L$ | $R_S$ | $R_L$ | $R_S$ |
| INDEP | 15 Ω, 70 W | 0.5 Ω, 5 W | 30 Ω, 40 W | 0.5 Ω, 5 W |
| PARALLEL | 7 Ω, 140 W | 10 Ω, 30 W | 15 Ω, 70 W | 0.5 Ω, 5 W |

### SLAVE Current Ripple

The following check verifies the SLAVE current ripple.

1. Set the power supply to INDEP operating mode by disengaging both TRACKING switches (both switches out).
2. Set the power supply SLAVE AMPS/VOLTS meter switch to VOLTS.
3. Set the power supply to 25 VDC using the digital display.
4. Connect the test oscilloscope and load resistors to the + and – terminals of the SLAVE output as shown in Figure 3. See Table 8 for the appropriate load resistor values.
5. Verify that the peak-to-peak ripple viewed on the oscilloscope is less than 3 mV.

## Constant Voltage Regulation Check

To check the constant voltage regulation of your power supply, perform the following tests.

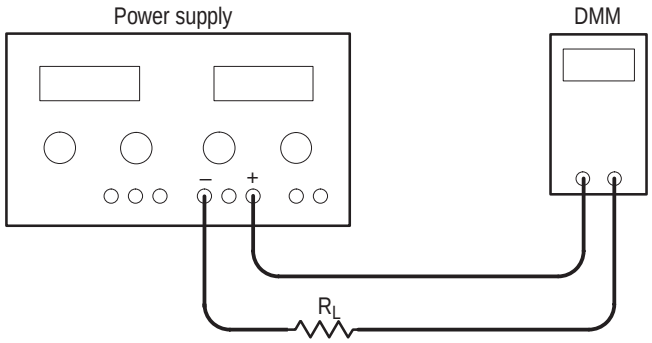


**Figure 4: Constant voltage test setup**

### MASTER Voltage Regulation

The following check verifies the MASTER voltage regulation performance.

1. Set the power supply to the INDEP operating mode by disengaging both TRACKING mode switches (both switches out).
2. Set up the digital multimeter to measure 60 VDC.
3. Connect the digital multimeter and load resistors to the + and – terminals of the power supply MASTER output as shown in Figure 4. See Table 9 for the appropriate load resistor values.
4. Verify that you can adjust the power supply from 0 to 30 V.
5. Set the power supply to the SERIES operating mode by engaging the left TRACKING mode switch (switch in) and disengaging the right TRACKING mode switch (switch out).
6. Verify that you can adjust the power supply from 0 to 60 V.
7. Set the power supply to the PARALLEL operating mode by engaging both TRACKING mode switches (both switches in).
8. Verify that you can adjust the power supply from 0 to 30 V.

**Table 9: Load resistor values for voltage checks**

| Mode | PS280 $R_L$ | PS283 $R_L$ |
|---|---|---|
| INDEP | 15 Ω, 70 W | 30 Ω, 40 W |
| SERIES | 30 Ω, 140 W | 60 Ω, 70 W |
| PARALLEL | 7.5 Ω, 140 W | 15 Ω, 70 W |
| 5V FIXED | 1.7 Ω, 20 W | 1.7 Ω, 20 W |

### SLAVE Voltage Regulation

The following check verifies the SLAVE voltage regulation performance.

1. Set the power supply to the INDEP operating mode by disengaging both TRACKING mode switches (both switches out).
2. Set up the digital multimeter to measure 30 VDC.
3. Connect the digital multimeter and load resistors to the + and – terminals of the SLAVE output as shown in Figure 4. See Table 9 for the appropriate load resistor values.
4. Verify that you can adjust the power supply from 0 to 30 V.

### 5 V Fixed Voltage Regulation

The following check verifies the 5 V fixed voltage regulation performance.

1. Set up the digital multimeter to measure 5 VDC.
2. Connect the digital multimeter and load resistors to the 5V FIXED 3A terminals. Use the test setup illustrated in Figure 4. See Table 9 for the appropriate load resistor values.
3. Verify that the power supply maintains an output of 5 V, ±0.25 V.

# PS280 and PS283 Adjustment Procedures

This section contains procedures to adjust PS280 and PS283 power supplies. If your instrument fails a performance requirement, use these procedures to return it to factory specifications.

In this section you will find the following information:

- A list of adjustments
- A list of test equipment needed to make the adjustments
- Instructions on how to prepare instruments for adjustment
- Step-by-step adjustment procedures

The procedures in this section do not verify performance. To confirm that your power supply meets factory specifications, implement the procedures in the *Performance Verification* section.

## List of Adjustments

Use the adjustments listed in Table 10 to return PS280 and PS283 power supplies to factory calibration.

**Table 10: PS280 and PS283 adjustments**

| |
|---|
| Independent Mode Adjustments |
| MASTER Voltage Output |
| SLAVE Voltage Output |
| MASTER Current Output |
| SERIES Tracking Mode Adjustments |
| Series Tracking |
| PARALLEL Tracking Mode Adjustments |
| Parallel Tracking |
| 5 V Fixed Output Adjustments |
| 5 V Output |
| Current Limit |
| Overload Indicator |

## Test Equipment

To ensure accurate adjustments, use the recommended or equivalent test equipment specified in Table 6 on page 8. If you substitute equipment, always choose instruments that meet or exceed the minimum requirements.

***NOTE.*** *Before making any adjustment, warm up the test equipment according to the manufacturer's recommendations.*

## Preparation for Adjustment

The following guidelines apply to all PS280 and PS283 power supply adjustments:

- Perform the adjustments in a 20° to 30° C (68° to 104° F) ambient environment with a relative humidity of 75% or less.
- Before making any adjustment, warm up the instrument for at least 20 minutes.
- Read the *Safety Summary* at the beginning of this manual.
- Do not alter any setting without reading the entire adjustment procedure first.
- Do not alter any setting unless a performance characteristic cannot be met at the current setting.

### Remove Instrument Cover

You must remove the instrument cover to make internal adjustments.

***WARNING.*** *To avoid electrical shock, disconnect the power cord from its source while removing the instrument cover. Following the adjustment procedure, replace the instrument cover before using the power supply.*

To remove the instrument cover, refer to Figure 5 while performing the following steps.

1. Remove the two handle mounting screws and remove the handle.
2. Remove the three screws on the left side and the three screws on the right side of the instrument.
3. Slide the cover toward the rear of the instrument and lift.

To reinstall the cover, perform steps 1 through 3 above in reverse order.

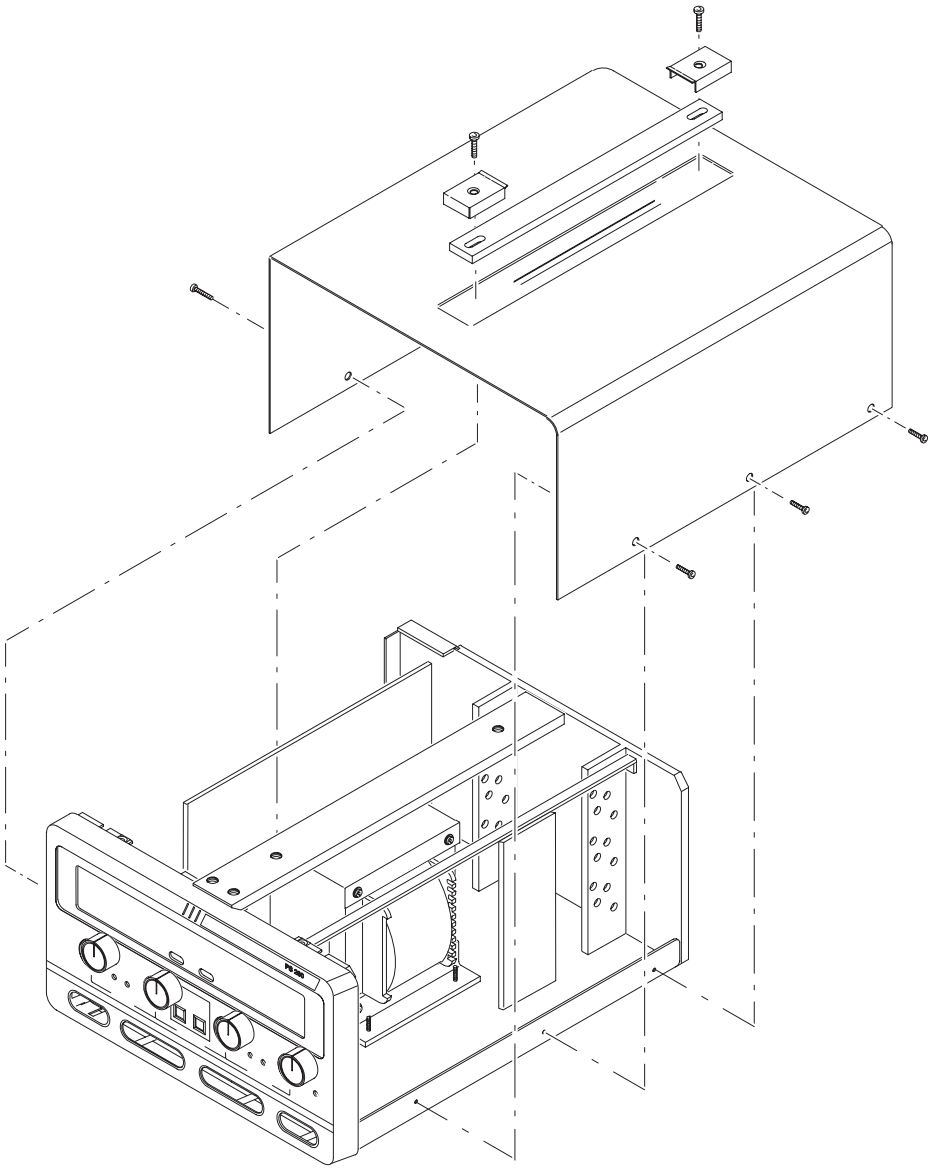

**Figure 5: PS280/PS283 instrument cover removal**

**Circuit Board Locations** Refer to Figure 6 to locate PS280/PS283 internal circuit boards.

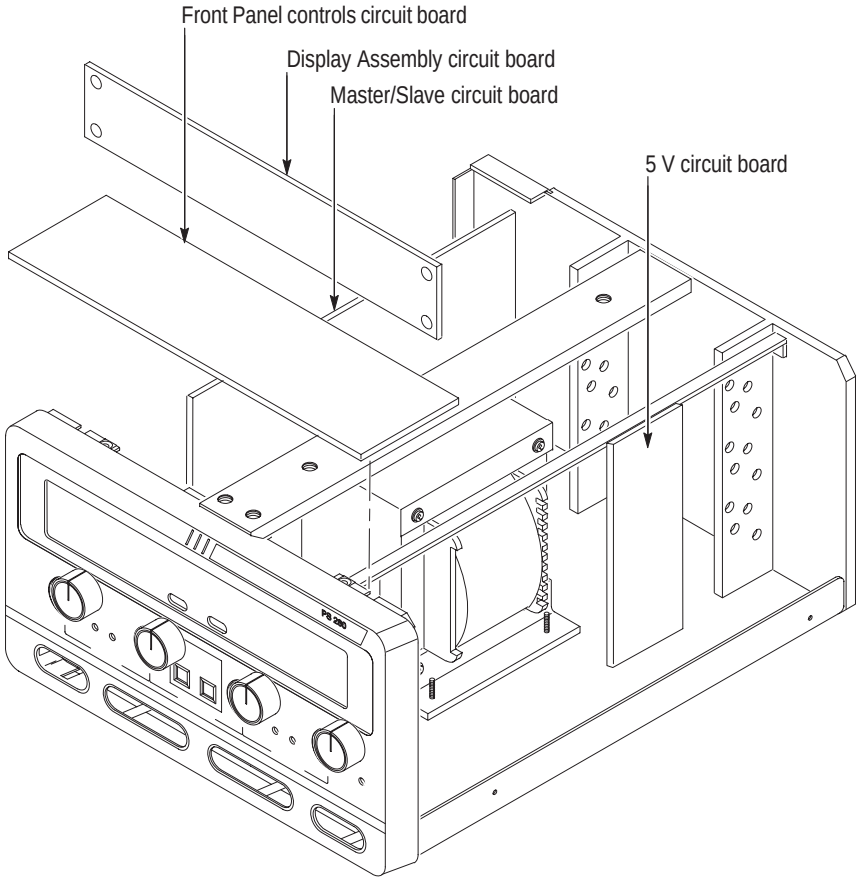


**Figure 6: PS280/PS283 internal circuit board locations**

## Independent Mode Adjustments

Refer to Figures 6, 7, and 8 for the circuit board and adjustment locations used in this procedure.

### MASTER Voltage Output

To adjust the MASTER voltage output, perform the following steps.

1. Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPendent operating mode.
2. Set the MASTER AMPS/VOLTS meter selection switch to VOLTS.
3. Set the digital multimeter to measure a DC voltage of ±16 mV.
4. Set the PS280/PS283 MASTER VOLTAGE control to minimum (fully counterclockwise).
5. Connect the digital multimeter to the + and – terminals of the MASTER output.
6. Adjust VR102 (Master/Slave circuit board) for a reading of –15 mV, within ±15 mV on the multimeter.
7. Set the digital multimeter to measure a DC voltage of ±35 V.
8. Set the MASTER VOLTAGE control to maximum (fully clockwise).
9. Adjust VR101 (Master/Slave circuit board) for a reading of 31.5 V on the multimeter.
10. Adjust VR201 (Display Assembly circuit board) until the PS280/PS283 front panel display reads 31.5 V.
11. Disconnect the digital multimeter from the power supply.

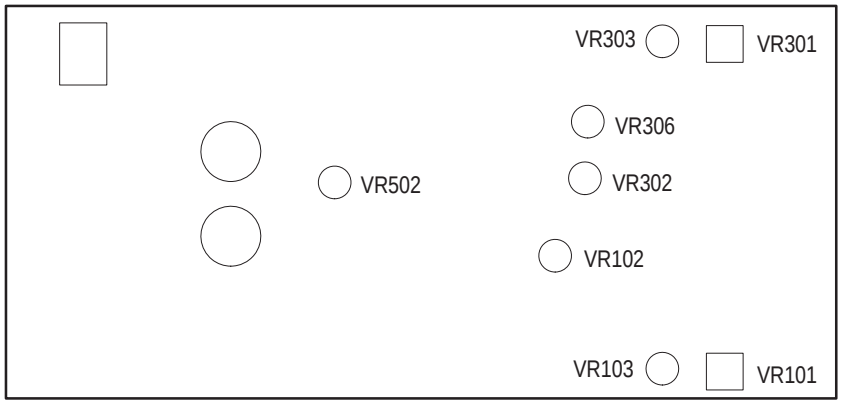


**Figure 7: Master/Slave circuit board adjustments**

### SLAVE Voltage Output

To adjust the SLAVE voltage output, perform the following steps.

1. Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPendent operating mode.
2. Set the SLAVE AMPS/VOLTS meter selection switch to VOLTS.
3. Set the digital multimeter to measure a DC voltage of ±16 mV.
4. Set the power supply SLAVE VOLTAGE control to minimum (fully counterclockwise).
5. Connect the digital multimeter to the + and – terminals of the SLAVE output.
6. Adjust VR302 (Master/Slave circuit board) for a reading of –15 mV, within ±15 mV on the multimeter.
7. Set the digital multimeter to measure a DC voltage of ±35 V.
8. Set the SLAVE VOLTAGE control to maximum (fully clockwise).
9. Adjust VR301 (Master/Slave circuit board) for a reading of 31.5 V on the multimeter.
10. Adjust VR601 (Display Assembly circuit board) until the PS280/PS283 front panel display reads 31.5 V.
11. Disconnect the digital multimeter from the power supply.

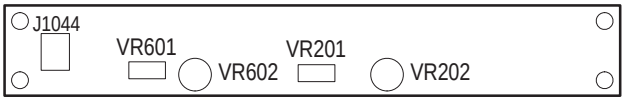


**Figure 8: Display Assembly circuit board adjustments**

### MASTER Current Output

To adjust the MASTER current output, perform the following steps.

1. Disengage both TRACKING mode switches (both switches out) so the power supply is in the INDEPendent operating mode.
2. Set the MASTER AMPS/VOLTS meter selection switch to AMPS.
3. Set the digital multimeter to measure a DC current of 2 A.
4. Connect the digital multimeter to the + and – terminals of the MASTER output.
5. Set the MASTER CURRENT control to maximum (fully clockwise).

6. Adjust VR103 (Master/Slave circuit board) for a reading of 1.05 A (PS283) or 2.1 A (PS280) on the multimeter.
7. Adjust VR202 (Display Assembly circuit board) until the PS280/PS283 front panel display reads 1.05 A (PS283) or 2.1 A (PS280).
8. Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPendent operating mode.
9. Set the SLAVE AMPS/VOLTS meter selection switch to AMPS.
10. Set the digital multimeter to measure a DC current of 2 A.
11. Connect the digital multimeter to the + and – terminals of the SLAVE output.
12. Set the SLAVE CURRENT control to maximum (fully clockwise).
13. Disconnect the digital multimeter from the power supply.

## Series Tracking Mode Adjustments

Refer to Figures 6, 7, and 9 for the circuit board and adjustment locations used in this procedure.

### SERIES Tracking

To adjust the series tracking mode, perform the following steps.

1. Engage the left TRACKING mode switch (switch in) and disengage the right TRACKING mode switch (switch out) so that the power supply is in the SERIES operating mode.
2. Set the SLAVE CURRENT control to midrange.
3. Set the MASTER VOLTAGE control to near minimum (counterclockwise).
4. Set the digital multimeter to measure a low DC voltage.
5. Connect the digital multimeter to the + and – terminals of the MASTER output and adjust the MASTER VOLTAGE control until the digital multimeter reads 500 mV.
6. Connect the digital multimeter to the + and – terminals of the SLAVE output.
7. Adjust VR306 (Master/Slave circuit board) until the voltage output of the SLAVE output matches the reading obtained from the MASTER output.
8. Set the MASTER VOLTAGE control to maximum (fully clockwise).
9. Set the digital multimeter to measure a DC voltage of ±35 V.

10. Connect the digital multimeter to the + and – terminals of the MASTER output and note the reading obtained.
11. Connect the digital multimeter to the + and – terminals of the SLAVE output.
12. Adjust VR501 (Front Panel Controls circuit board) until the voltage of the SLAVE output matches the reading obtained from the MASTER output in step 10 above.
13. Recheck the value of the MASTER output compared to the value of the SLAVE output. Readjust VR501 if the outputs do not match.
14. Disconnect the test setup.


**Figure 9: Front Panel Controls circuit board adjustments**

## Parallel Tracking Mode Adjustments

Refer to Figures 6 and 7 for the circuit board and adjustment locations used in this procedure.

### PARALLEL Tracking

To adjust the PARALLEL tracking Mode, perform the following steps.

1. Disengage both TRACKING mode switches (both switches out) so that the power supply is in the INDEPendent operating mode.
2. Set the MASTER VOLTAGE and CURRENT controls to minimum (fully counterclockwise).
3. Set the digital multimeter to measure a DC current of 4 A.
4. Connect the digital multimeter to the + and – terminals of the MASTER output.
5. Set the MASTER VOLTAGE control to midrange and adjust the MASTER CURRENT control until a reading of 1 A (PS283) or 2 A (PS280) is displayed on the multimeter.

***NOTE**. Do not readjust the CURRENT control setting through the remainder of this procedure.*

6. Engage both TRACKING switches (both switches in) so that the power supply is in the PARALLEL operating mode.
7. Set the SLAVE CURRENT control to maximum (fully clockwise) and set the SLAVE VOLTAGE control to midrange.
8. Adjust VR502 (Master/Slave circuit board) until a reading of 2 A (PS283) or 4 A (PS280) is displayed on the multimeter.
9. Disconnect the test setup.

## 5 V Fixed Output Adjustments

Refer to Figures 6 and 10 for the circuit board and adjustment locations used in this procedure.

### 5 V Output

To adjust the 5 V fixed output, perform the following steps.

1. Set the digital multimeter to measure a DC voltage of +5.25 V.
2. Connect the digital multimeter to the terminals of the 5 V FIXED 3A output.
3. Adjust VR401 (5 V circuit board) until the multimeter displays 5.00 V ±0.25 V.
4. Disconnect the multimeter from the power supply.

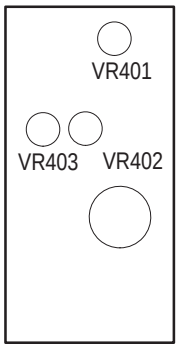


**Figure 10: 5 V circuit board adjustments**

### Current Limit

To adjust the current limit, perform the following steps.

1. Set the digital multimeter to measure a DC current of 3.25 A.
2. Adjust VR403 (5 V circuit board) fully counterclockwise.
3. Connect a variable load and the multimeter in series to the terminals of the 5 V FIXED 3A output.
4. Adjust the variable load until the multimeter displays 3.25 A.
5. Disconnect the multimeter from the power supply and reconnect the variable load (without changing the setting) to the terminals of the 5 V FIXED 3A output.
6. Set the digital multimeter to measure a DC voltage of +5.25 V.
7. Connect the digital multimeter to the terminals of the 5 V FIXED 3A output.
8. Slowly adjust VR403 (5 V circuit board) clockwise until the multimeter display shows a voltage drop of 5 to 6 mV.
9. Disconnect the test setup.

### Overload Indicator

To adjust the current limit overload indicator, perform the following steps.

1. Set the digital multimeter to measure a DC current of 3.25 A.
2. Connect a variable load and the multimeter in series to the terminals of the 5 V FIXED 3A output.
3. Adjust the variable load until the multimeter displays 3.10 A.
4. Adjust VR402 (5 V circuit board) until the OVERLOAD 5V3A indicator starts to light on the power supply.
5. Disconnect the test setup.