

O P E R A T I N G A N D S E R V I C E M A N U A L

DC POWER SUPPLY

MPB-3 SERIES, MODEL 6289A

SERIAL NUMBER PREFIX 7G

HEWLETT  PACKARD

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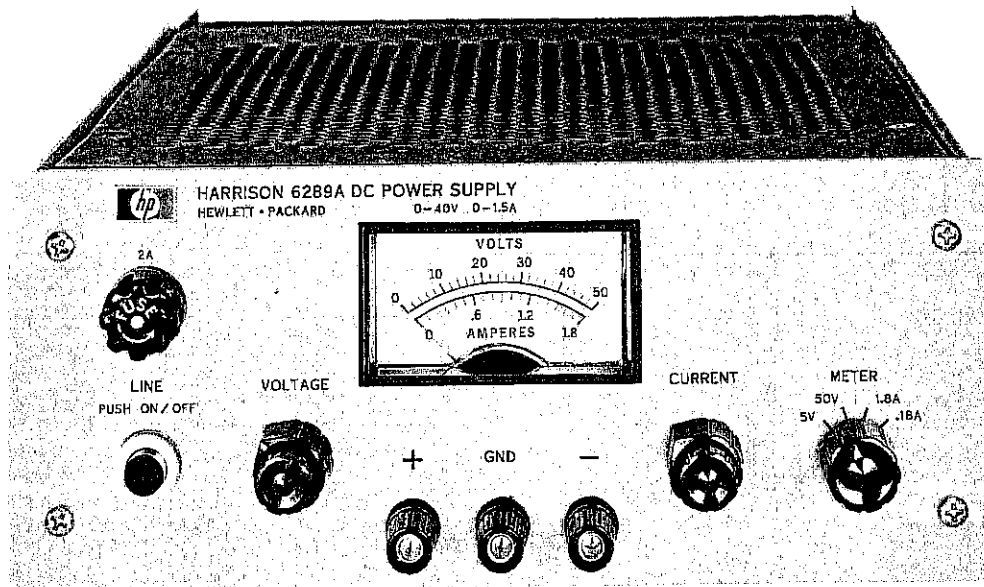


Figure 1-1. DC Power Supply, Model 6289A

SECTION I
GENERAL INFORMATION

1-1 DESCRIPTION

1-2 This power supply, Figure 1-1, is completely transistorized and suitable for either bench or relay rack operation. It is a compact, well-regulated, Constant Voltage/Constant Current supply that will furnish full rated output voltage at the maximum rated output current or can be continuously adjusted throughout the output range. The front panel CURRENT controls can be used to establish the output current limit (overload or short circuit) when the supply is used as a constant voltage source and the VOLTAGE controls can be used to establish the voltage limit (ceiling) when the supply is used as a constant current source. The supply will automatically crossover from constant voltage to constant current operation and vice versa if the output current or voltage exceeds these preset limits.

1-3 The power supply has both front and rear terminals. Either the positive or negative output terminal may be grounded or the power supply can be operated floating at up to a maximum of 300 Volts off ground.

1-4 A single meter is used to measure either output voltage or output current in one of two ranges. The voltage or current ranges are selected by a METER switch on the front panel.

1-5 The programming terminals located at the rear of the unit allow ease in adapting to the many operational capabilities of the power supply. A brief description of these capabilities is given below:

a. Remote Programming. The power supply may be programmed from a remote location by means of an external voltage source or resistance.

b. Remote Sensing. The degradation in regulation which occurs at the load because of the voltage drop in the load leads can be reduced by using the power supply in the remote sensing mode of operation.

c. Series and Auto-Series Operation. Power supplies may be used in series when a higher output voltage is required in the constant voltage mode of operation or when greater voltage compliance is required in the constant current mode of operation. Auto-Series operation permits one knob control of the total output voltage from a "master" supply.

d. Parallel and Auto-Parallel Operation. The power supply may be operated in parallel with a similar unit when greater output current capability

is required. Auto-Parallel operation permits one knob control of the total output current from a "master" supply.

e. Auto-Tracking. The power supply may be used as a "master" supply, having control over one (or more) "slave" supplies that furnish various voltages for a system.

1-6 SPECIFICATIONS

1-7 Detailed specifications for the power supply are given in Table 1-1.

1-8 OPTIONS

1-9 Options are factory modifications of a standard instrument that are requested by the customer. The following options are available for the instrument covered by this manual. Where necessary, detailed coverage of the options is included throughout the manual.

<u>Option No.</u>	<u>Description</u>						
07	<u>Voltage 10-Turn Potentiometer:</u> A single control that replaces both coarse and fine voltage controls and improves output settability (6281A, 6284A, and 6289A only).						
08	<u>Current 10-Turn Pot:</u> A single control that replaces both coarse and fine current controls and improves output settability.						
09	<u>Voltage and Current 10-Turn Pots:</u> Consists of Options 07 and 08 on the same instrument. (6281A, 6284A, and 6289A only.)						
11	<u>Internal Overvoltage "Crowbar":</u> Protects delicate loads by monitoring the output voltage and firing an SCR that shorts the output when a preset trip voltage is exceeded. The circuit board is factory installed within the supply and a Crowbar Adjust control is mounted on the front panel. <u>Trip Voltage Range:</u>						
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;"><u>6281A</u></th> <th style="text-align: center;"><u>6284A</u></th> <th style="text-align: center;"><u>6289A</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">2.5-10V</td> <td style="text-align: center;">2.5-23V</td> <td style="text-align: center;">2.5-44V</td> </tr> </tbody> </table>	<u>6281A</u>	<u>6284A</u>	<u>6289A</u>	2.5-10V	2.5-23V	2.5-44V
<u>6281A</u>	<u>6284A</u>	<u>6289A</u>					
2.5-10V	2.5-23V	2.5-44V					

<u>Option No.</u>	<u>Description</u>	<u>Ⓢ Part No.</u>	<u>Description</u>
11 (Continued)	<u>Trip Voltage Margin:</u> The minimum crowbar trip setting above the desired operating voltage to prevent false crowbar tripping is 4% of the output voltage setting plus 2 Volts. Refer to Appendix A for complete details.	14523A	Rack Kit for mounting two 3½"-high supplies. (Refer to Section II for details.)
13	<u>Three Digit Graduated Decadal Voltage Control:</u> Control that replaces voltage control permitting accurate resettability.		
14	<u>Three Digit Graduated Decadal Current Control:</u> Control that replaces coarse and fine current controls permitting accurate resettability.		
28	<u>Rewire for 230Vac Input:</u> Supply as normally shipped is wired for 115Vac input. Option 28 consists of reconnecting the input transformer for 230 Vac operation.		

1-10 ACCESSORIES

1-11 The accessories listed in the following chart may be ordered with the power supply or separately from your local Hewlett-Packard field sales office. (Refer to list at rear of manual for addresses.)

<u>Ⓢ Part No.</u>	<u>Description</u>
C05	8" Black Handle that can be attached to side of supply.
14513A	Rack Kit for mounting one 3½"-high supply. (Refer to Section II for details.)

1-12 INSTRUMENT IDENTIFICATION

1-13 Hewlett-Packard power supplies are identified by a three-part serial number tag. The first part is the power supply model number. The second part is the serial number prefix, which consists of a number-letter combination that denotes the date of a significant design change. The number designates the year, and the letter A through L designates the month, January through December respectively. The third part is the power supply serial number.

1-14 If the serial number prefix on your power supply does not agree with the prefix on the title page of this manual, change sheets are included to update the manual. Where applicable, backdating information is given in an appendix at the rear of the manual.

1-15 ORDERING ADDITIONAL MANUALS

1-16 One manual is shipped with each power supply. Additional manuals may be purchased from your local Hewlett-Packard field office (see list at rear of this manual for addresses). Specify the model number, serial number prefix, and Ⓢ part number provided on the title page.

Table 1-1. Specifications

INPUT:

105-125/210-250VAC, single phase,
50-400 Hz.

OUTPUT:

0-40 volts @ 1.5 amps.

LOAD REGULATION:

Constant Voltage--Less than 0.01% plus 2mv
for a full load to no load change in output current.

Constant Current--Less than 0.01% plus 250 μ a
for a zero to maximum change in output voltage.

LINE REGULATION:

Constant Voltage--Less than 0.01% plus 2 mv
for any line voltage change within the input rating.

Constant Current--Less than 0.01% plus 250 μ a
for any line voltage change within the input rating.

RIPPLE AND NOISE:

Constant Voltage--Less than 200 μ v rms.

Constant Current--Less than 500 μ a rms.

TEMPERATURE RANGES:

Operating: 0 to 50°C. Storage: -20 to +85°C.

TEMPERATURE COEFFICIENT:

Constant Voltage--Less than 0.02% plus 500 μ v
per degree Centigrade.

Constant Current--Less than 0.02% plus 0.8ma
per degree Centigrade.

STABILITY:

Constant Voltage--Less than 0.10% plus 2.5mv
total drift for 8 hours after an initial warm-up
time of 30 minutes at constant ambient, constant
line voltage, and constant load.

Constant Current--Less than 0.10% plus 4ma
total drift for 8 hours after an initial warm-up
time of 30 minutes at constant ambient, constant
line voltage, and constant load.

**INTERNAL IMPEDANCE AS A CONSTANT VOLTAGE
SOURCE:**

Less than 0.001 ohm from DC to 100Hz.

Less than 0.01 ohm from 100Hz to 1KHz.

Less than 0.2 ohm from 1KHz to 100KHz.

Less than 2.0 ohms from 100KHz to 1MHz.

TRANSIENT RECOVERY TIME:

Less than 50 μ sec for output recovery to with-
in 15mv following a full load current change in
the output.

OVERLOAD PROTECTION:

A continuously acting constant current circuit
protects the power supply for all overloads.

including a direct short placed across the terminals
in constant voltage operation. The constant volt-
age circuit limits the output voltage in the constant
current mode of operation.

METER:

The front panel meter can be used as either a
0-50 or 0-5 volt voltmeter or as a 0-1.8 amp or
0-0.18 amp ammeter.

OUTPUT CONTROLS:

Coarse and fine voltage controls and coarse and
fine current controls set desired output voltage or
current.

OUTPUT TERMINALS:

Three "five-way" output posts are provided on
the front panel and an output terminal strip is lo-
cated on the rear of the chassis. All power supply
output terminals are isolated from the chassis and
either the positive or negative terminal may be con-
nected to the chassis through a separate ground
terminal located on the output terminal strip.

ERROR SENSING:

Error sensing is normally accomplished at the
front terminals if the load is attached to the front
or at the rear terminals if the load is attached to
the rear terminals. Also, provision is included on
the rear terminal strip for remote sensing.

REMOTE PROGRAMMING:

Remote programming of the supply output at
approximately 200 ohms per volt in constant volt-
age is made available at the rear terminals. In con-
stant current mode of operation, the current can be
remotely programmed at approximately 500 ohms
per ampere.

COOLING:

Convection cooling is employed. The sup-
ply has no moving parts.

SIZE:

3 $\frac{1}{2}$ " H x 14 $\frac{1}{2}$ " D x 8 $\frac{1}{2}$ " W. Two of the units can
be mounted side by side in a standard 19" relay
rack.

WEIGHT:

14 lbs. net, 19 lbs. shipping.

FINISH:

Light gray front panel with dark gray case.

POWER CORD:

A three-wire, five-foot power cord is provided
with each unit.

SECTION II INSTALLATION

2-1 INITIAL INSPECTION

2-2 Before shipment, this instrument was inspected and found to be free of mechanical and electrical defects. As soon as the instrument is unpacked, inspect for any damage that may have occurred in transit. Save all packing materials until the inspection is completed. If damage is found, proceed as described in the Claim for Damage in Shipment section of the warranty page at the rear of this manual.

2-3 MECHANICAL CHECK

2-4 This check should confirm that there are no broken knobs or connectors, that the cabinet and panel surfaces are free of dents and scratches, and that the meter is not scratched or cracked.

2-5 ELECTRICAL CHECK

2-6 The instrument should be checked against its electrical specifications. Section V includes an

"in-cabinet" performance check to verify proper instrument operation.

2-7 INSTALLATION DATA

2-8 The instrument is shipped ready for bench operation. It is necessary only to connect the instrument to a source of power and it is ready for operation.

2-9 LOCATION

2-10 This instrument is air cooled. Sufficient space should be allotted so that a free flow of cooling air can reach the sides and rear of the instrument when it is in operation. It should be used in an area where the ambient temperature does not exceed 50°C.

2-11 RACK MOUNTING

2-12 This instrument may be rack mounted in a standard 19" rack panel either alongside a similar

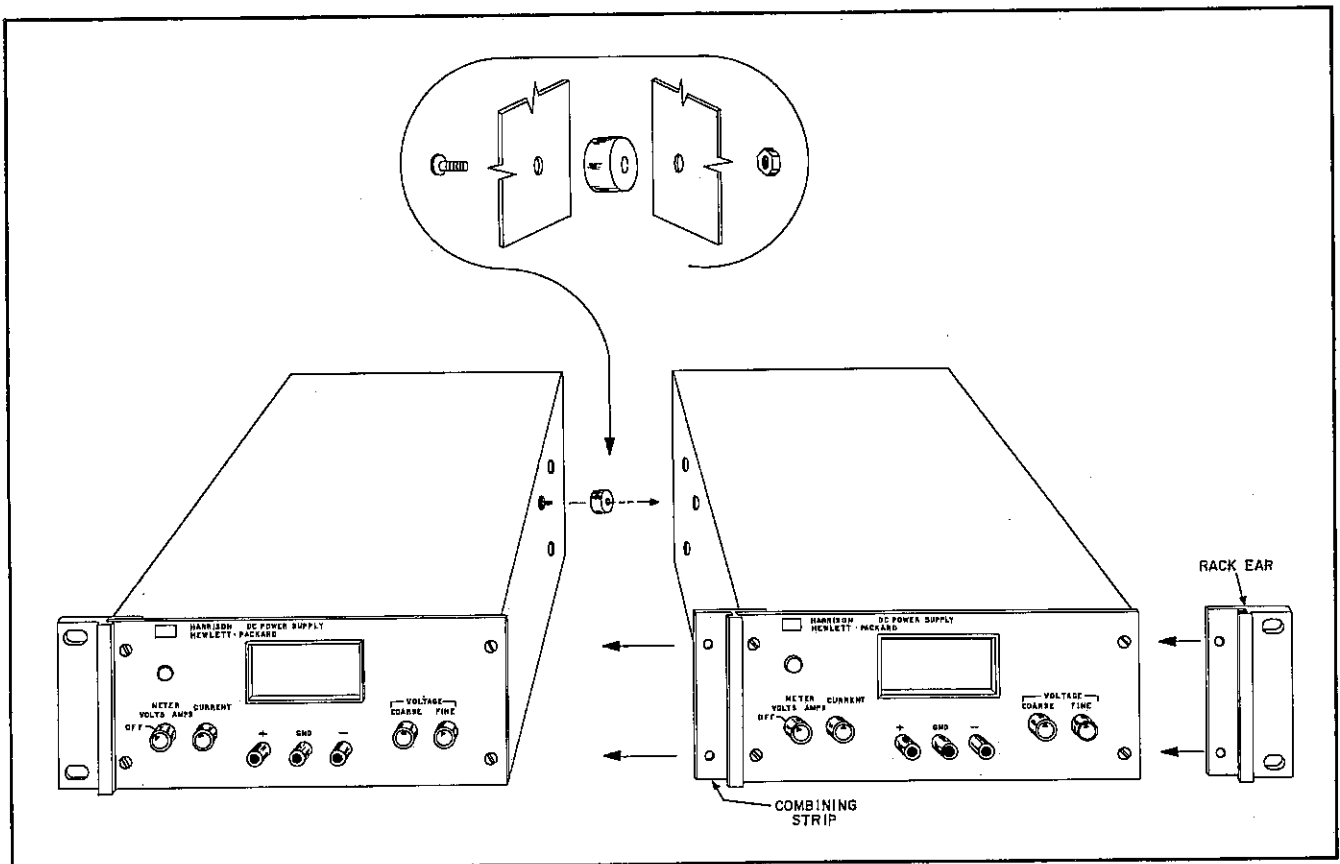


Figure 2-1. Rack Mounting, Two Units

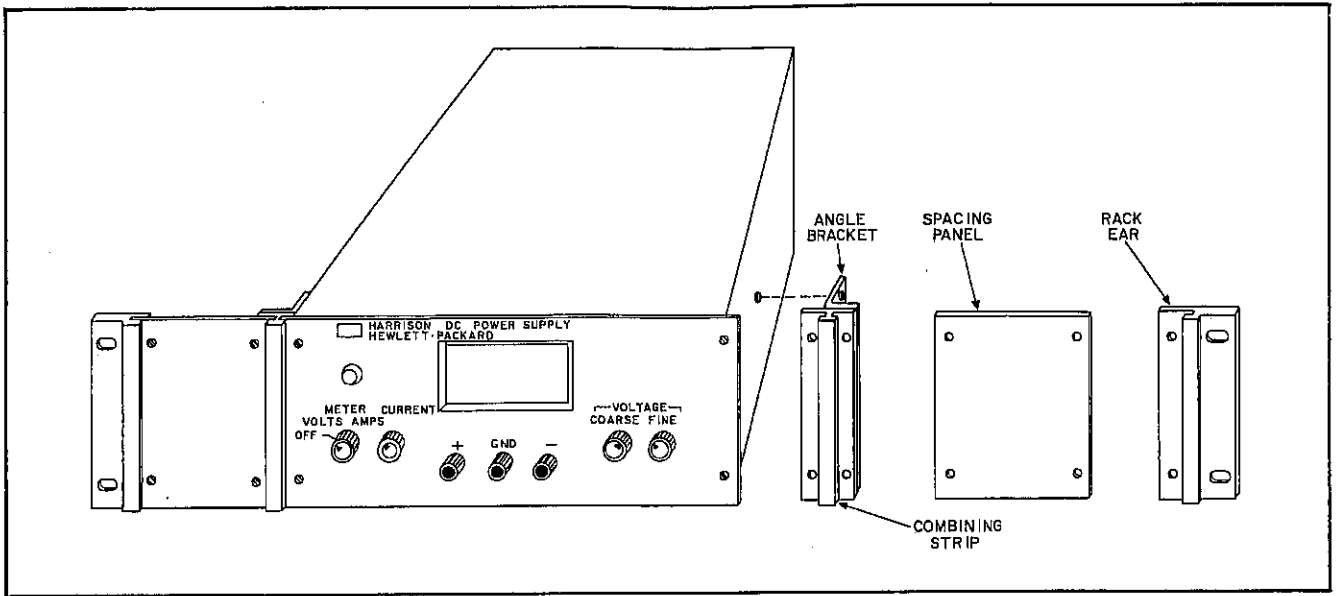


Figure 2-2. Rack Mounting, One Unit

unit or by itself. Figures 2-1 and 2-2 show how both types of installations are accomplished.

2-13 To mount two units side-by-side, proceed as follows:

- a. Remove the four screws from the front panels of both units.
- b. Slide rack mounting ears between the front panel and case of each unit.
- c. Slide combining strip between the front panels and cases of the two units.
- d. After fastening rear portions of units together using the bolt, nut, and spacer, replace panel screws.

2-14 To mount a single unit in the rack panel, proceed as follows:

- a. Bolt rack mounting ears, combining straps, and angle brackets to each side of center spacing panels. Angle brackets are placed behind combining straps as shown in Figure 2-2.
- b. Remove four screws from front panel of unit.
- c. Slide combining strips between front panel and case of unit.
- d. Bolt angle brackets to front sides of case and replace front panel screws.

2-15 INPUT POWER REQUIREMENTS

2-16 This power supply may be operated from either a nominal 115V or 230V, 48-440Hz power source. The unit, as shipped from the factory, is wired for 115V operation. The input power required when operated from a 115V 60Hz power source at full load is:

<u>6281A, 6289A, 6294A</u>	<u>6284A</u>
118W, 1.5A	135W, 1.5A

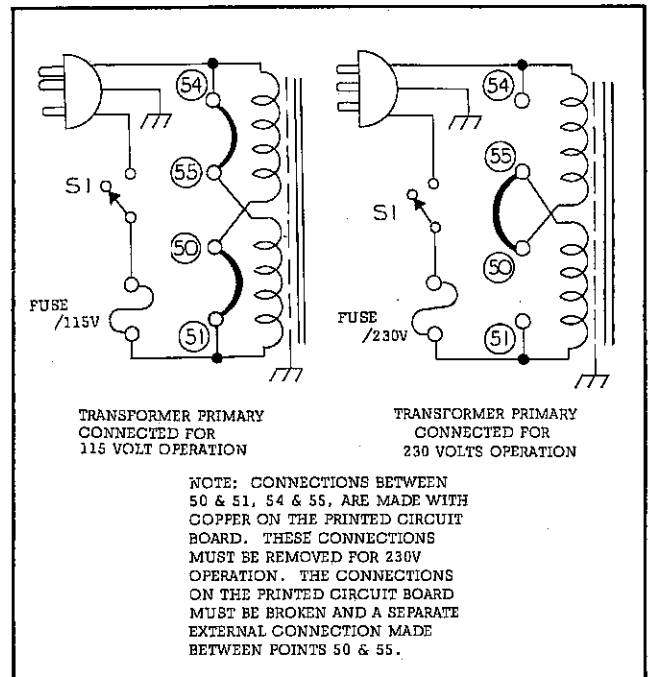


Figure 2-3. Primary Connections

2-17 CONNECTIONS FOR 230 VOLT OPERATION
(See Figure 2-3)

2-18 Normally, the two primary windings of the input transformer are connected in parallel for operation from 115 Volt source. To convert the power supply to operation from a 230 Volt source, the power transformer windings are connected in series as follows:

- a. Unplug the line cord and remove the unit from case.
- b. Break the copper between 54 and 55 and also between 50 and 51 on the printed circuit board. These are shown in Figure 2-3, and are labeled on copper side of printed circuit board.
- c. Add strap between 50 and 55.
- d. Replace existing fuse with 1 Ampere, 230 Volt fuse. Return unit to case and operate normally.

2-19 POWER CABLE

2-20 To protect operating personnel, the National Electrical Manufacturers' Association (NEMA) recommends that the instrument panel and cabinet be grounded. This instrument is equipped with a three conductor power cable. The third conductor is the ground conductor and when the cable is plugged into an appropriate receptacle, the instrument is grounded. The offset pin on the power cable three-

prong connector is the ground connection.

2-21 To preserve the protection feature when operating the instrument from a two-contact outlet, use a three-prong to two-prong adapter and connect the green lead on the adapter to ground.

2-22 REPACKAGING FOR SHIPMENT

2-23 To insure safe shipment of the instrument, it is recommended that the package designed for the instrument be used. The original packaging material is reusable. If it is not available, contact your local Hewlett-Packard field office to obtain the materials. This office will also furnish the address of the nearest service office to which the instrument can be shipped. Be sure to attach a tag to the instrument which specifies the owner, model number, full serial number, and service required, or a brief description of the trouble.