

PC / AT / PS2 Power Supply Load Tester User and Service Manual

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Overview

The PC / AT / PS2 Power Supply Load Tester (also known as the AT PS Test) is a compact and convenient device which allows for rapid testing of computer power supplies utilizing the connector pinout standard defined with the original IBM PC. This standard was used in the PC, the XT, the AT, some PS/2 systems, and most clones up until around 1995 when the ATX standard became the norm. Power supplies using this standard (and thus compatible with the AT PS Test) are easily identifiable since they utilize two six-pin connectors (usually labeled P8 and P9) placed side-by-side to supply power to the motherboard. See Figure 2. Such supplies will typically not start unless a minimum load requirement is met (this can be quite high - up to ~50% of full load.) Thus, the AT PS Test contains on-board load resistors to provide this load to the supply under test. It also provides status LEDs which indicate the presence of sufficient voltage on each of the rails as well as the presence of the 'Power Good' signal from the supply. In addition, the AT PS Test has banana plug binding posts for each supply rail and jumpers to disconnect the on-board load resistors, allowing it to serve as a break-out box for testing power supplies with an external electronic load. Figure 1 (below) shows an overview of the components on the AT PS Test.

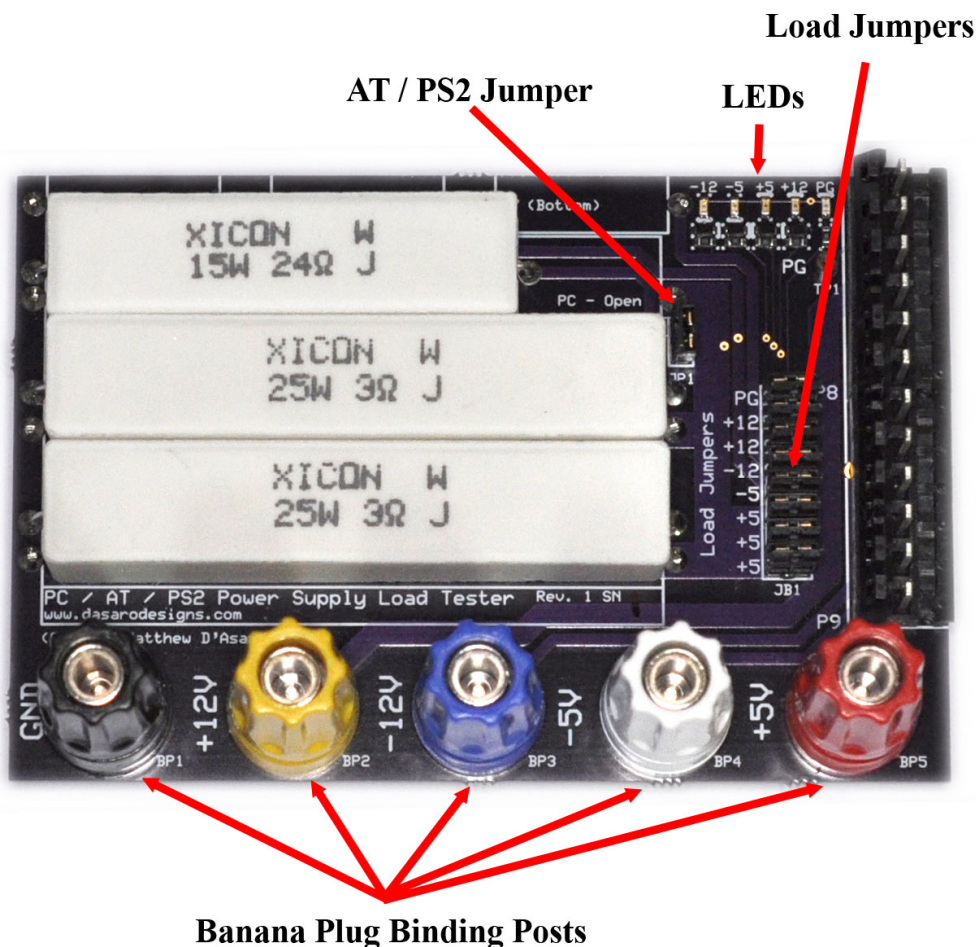


Figure 1: Diagram showing the locations of important feature of the AT PS Test

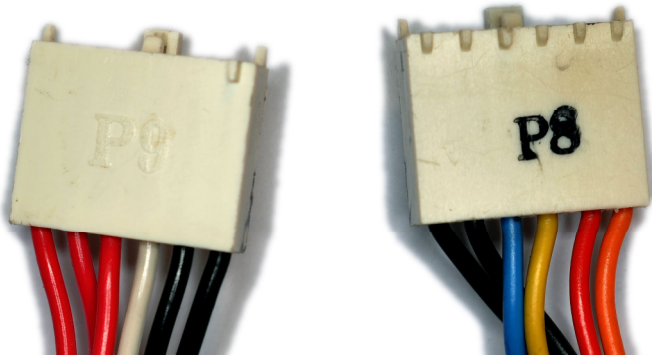


Figure 2: Example of connectors on power supply compatible with the AT PS Test

Using the AT PS Test with for rapidly testing AT-style Power Supplies

The AT PS Test is a very convenient tool for quickly finding failed power supplies without having to remove the suspect supply from the computer case or substitute a known working one. To use, simply follow the steps below.

- 1) Turn off the power supply and disconnect the mains.
- 2) Disconnect the power supply from the motherboard and all drives.
- 3) Connect the 'P8/P9' motherboard connectors from the power supply to the AT PS Test. **BE SURE TO CONNECT THEM SUCH THAT THE BLACK (GROUND) WIRES ARE ADJACENT TO EACH OTHER AS SHOWN IN FIGURE 2 TO AVOID DAMAGE TO THE POWER SUPPLY.** Remember: "black to black" or smoke and sparks!
- 4) Be sure the load jumpers on the AT PS Test are installed.
- 5) Install the AT/PS2 jumper if the power supply you are testing can support 2.5A on the +12V rail. This will be true for all supplies except some intended for use in the original IBM PC.
- 6) Connect the mains and turn on the power supply. If the power supply is working correctly four red LEDs on the AT PS Test will illuminate with equal (and high) brightness and a split-second later the green LED will illuminate (usually with slightly less brightness.)
- 7) OPTIONAL: To verify that each power supply output rail is operating at the correct voltage and without excess ripple a digital volt meter may conveniently be used to measure the DC and AC voltage of each supply rail using the banana plug binding posts provided along the bottom of the AT PS Test.
- 8) Turn off the supply – the test is complete.

NOTE: Although it will not be damaged, the AT PS Test will become hot if left on for more than a few seconds. Extended time testing is not recommended. If the AT PS Test is left on for an extended period of time, take extreme care in moving it as it will be extremely hot.

If not all of the LEDs illuminate, or they illuminate the power supply has problems. Use Table 1 on the next page to help troubleshoot.

Table 1: Power supply troubleshooting chart

Symptom	Cause
One or more red LEDs does not light	The voltage rail(s) corresponding to those LEDs (as labeled above them) are providing no output or are providing output at more than ~1V volt below specification.
Red LEDs light at unequal brightness	One or more output rails is providing excessive voltage OR One or more output rails is providing insufficient voltage, but not by more than ~1V below specification OR One or more output rails has excessive ripple
The green LED does not light	The power supply is not producing its 'Power Good' signal. This is usually (but not always) coupled with one or more rails providing insufficient output voltage. See above.
The green LED lights at the same time as the red LEDs (no delay).	Turn the supply off and back on a couple of times to be sure that there is indeed no delay - it is sometimes hard to see. If it is indeed not present this indicates that the supply is not waiting for the output voltage to stabilize before indicating 'Power Good'. This is likely to result in unreliable system booting.

On board Load Specifications

The on-board load resistors were selected to test the original IBM PC power supply at nearly full rated output current and to test AT and later power supplies at close to minimum rated output current. See the tables below.

Table 2: Original IBM PC Power Supply Specifications

Rail	Minimum Load	Maximum Load
+5V	N/A	7.0A
+12V	N/A	2.0A
-5V	N/A	0.3A
-12V	N/A	0.25A

Table 3: IBM PC AT Power Supply Specifications

Rail	Minimum Load	Maximum Load
+5V	7.0A	19.8A
+12V	2.5A	7.3A
-5V	N/A	0.3A
-12V	N/A	0.3A

Table 4: AT PS Test On-Board Load

Rail	Load	
	AT / PS2 Jumper Installed	AT / PS2 Jumper Removed
+5V	7A	7A
+12V	2.5A	2.0A
-5V	0.25A	0.25A
-12V	0.11A	0.11A

Use in Breakout Box Mode

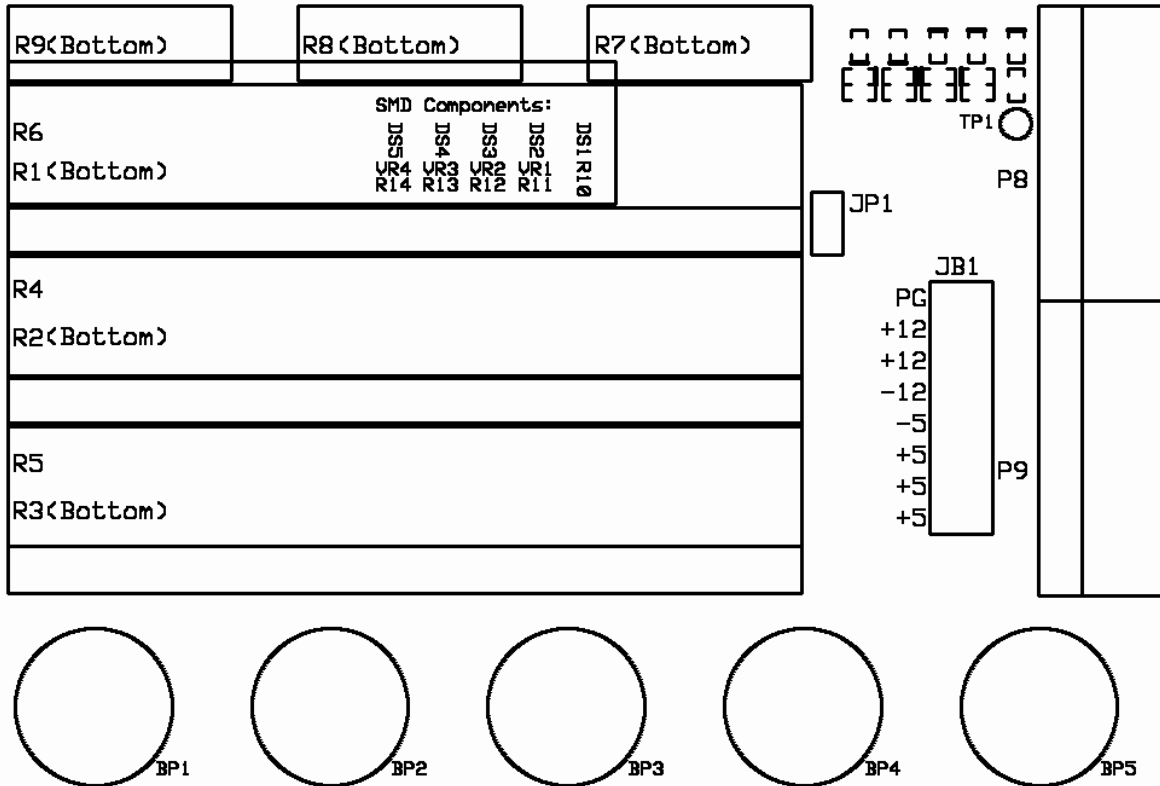
As well as functioning as a convenient field-tester, the AT PS Test also serves as a handy test accessory when testing, characterizing, or servicing AT power supplies in a lab environment. To use the AT PS Test in this way, remove each of the load jumpers. This will disconnect the on-board load resistors and LEDs from the power supply rails, but leave the banana plug binding posts connected. These conveniently labeled binding posts can be used to connect external load and measurement equipment to the power supply under test.

In addition, this feature can be used selectively, disconnecting the load from the +12V rail, for example, while leaving it connected to the other rails. This allows a single rail to be loaded externally for detailed testing while still leaving the other rails minimally loaded with the on-board load so that the supply will operate. When this is performed, be sure to remove all of the load jumpers for the rail of interest. Due to the current limitations of jumpers, there are three load jumpers on the +5V rail, two on the +12V rail, and one on each of the -5V and -12V rails.

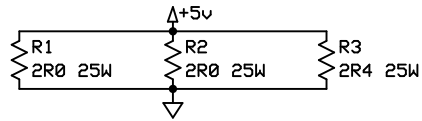
NOTE: Although it will not be damaged, the AT PS Test will become hot if left on for more than a few seconds. Extended time testing is not recommended. If the AT PS Test is left on for an extended period of time, take extreme care in moving it as it will be extremely hot.

Servicing the Hardware

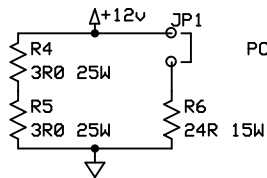
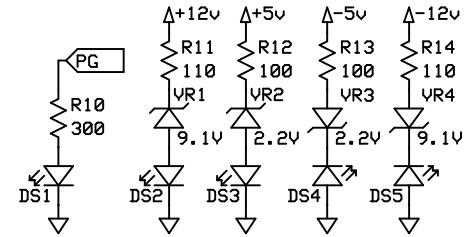
The AT PS Test is designed for long life and built with only top-quality components and all resistors are operated at or below 50% of their rated power dissipation. Furthermore, it is backed by a simple lifetime guarantee – if it ever fails, just return it for a free repair. However, in the event that field service is required, a component layout diagram, schematic, and a complete parts list are included on the following pages.



AT PS Test Component Layout

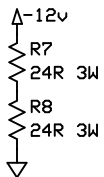
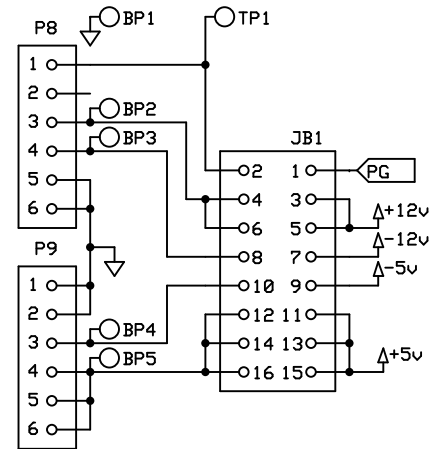


+5V Load - 0.71 Ohms, 7A, 35W

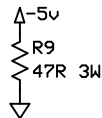


PC / AT Jumper

+12V Load - 6 Ohms / 4.8 Ohms, 2A / 2.5A, 24W / 30W



-5V Load - 48 Ohms, 0.25A, 3W



-5V Load - 47 Ohms, 0.11A, 0.53W

D'Asaro Designs		
AT PS Test		
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AT PS Test Rev. 1 Parts List

Reference Designation	Quantity	Mfg.	Mfg. P/N	Mouser P/N	DigiKey P/N	Description / Notes
BP1	1	Deltron	552-0100 BLK	164-4201	N/A	Black binding post
BP2	1	Deltron	552-0700 YEL	164-4207	N/A	Yellow binding post
BP3	1	Deltron	552-0200 BLU	164-4202	N/A	Blue Binding post
BP4	1	Deltron	552-0600 WHT	164-4206	N/A	White Binding post
BP5	1	Deltron	552-0500 RED	164-4205	N/A	Red binding post
DS1	1	Vishay	VLMG1300-GS08	78-VLMG1300-GS08	VLMG1300-GS08CT-ND	Green 0603 LED
DS2-DS5	4	Vishay	VLMS1300-GS08	78-VLMS1300-GS08	VLMS1300-GS08CT-ND	Red 0603 LED
JB1	1	FCI	67997-116HLF	649-67997-116HLF	609-3228-ND	16 position 2-row Au-Plated header
JP1	1	FCI	68001-102HLF	649-68001-102HLF	609-3506-ND	2 position Au-Plated header
P8, P9	2	Molex	36642-0001	538-36642-0001	0366420001-ND	AT Motherboard Power Supply Connector
R1, R2	2	Xicon	280-CR25-2.0-RC	280-CR25-2.0-RC	N/A	2-Ohm 25W, 5%
R3	1	Xicon	280-CR25-2.4-RC	280-CR25-2.4-RC	N/A	2.4-Ohm 25W, 5%
R4, R5	2	Xicon	280-CR25-3.0-RC	280-CR25-3.0-RC	N/A	3-Ohm 25W, 5%
R6	1	Xicon	280-CR15-24-RC	280-CR15-24-RC	N/A	24-Ohm, 15W, 5%
R7, R8	2	Panasonic	ERG-3SJ240V	667-ERG-3SJ240V	P47W-3BK-ND	24-Ohm, 3W, 5%

R9	1	Panasonic	ERG-3SJ470A	667-ERG-3SJ470A	P47W-3BK-ND	47-Ohm, 3W, 5%
R10	1	Vishay	CRCW0603300RJNEA	71-CRCW0603J-300-E3	541-300GCT-ND	300-Ohm, 0603, 5%
R11, R14	2	Vishay	CRCW0603110RJNEA	71-CRCW0603J-110-E3	541-110GCT-ND	110-Ohm, 0603, 5%
R12, R13	2	Vishay	CRCW0603100RJNEA	71-CRCW0603J-100-E3	541-100GCT-ND	100-Ohm, 0603, 5%
TP1	1	Kobiconn	151-204-RC	151-204-RC	N/A	Brown Test Point
VR1, VR4	1	Comchip Technology	CZRU52C9V1	750-CZRU52C9V1	641-1035-1-ND	9.1V 0603 Zener Diode
VR2, VR3	2	Comchip Technology	CZRU52C2V2	750-CZRU52C2V2	641-1020-1-ND	2.2V 0603 Zener Diode
N/A	9	TE Connectivity	881545-1	571-8815451	881545-1-ND	Au-Plated jumpers