

User Manual

D4049

Issue 3/85

86 Watt Power Supply

PART NUMBER 390214-01-9

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CHAPTER 1

INTRODUCTION

1.1 DESCRIPTION

Bristol Babcock power supply Part No. 390214-01-9 is a general purpose 24-V dc regulated power source. It is suitable for a variety of instrument applications. For example, its output is sufficient to power a Bristol Babcock RDC 3350 with one MIO board and its field loop requirements. The unit is rated at 86 watts output (3.6 A) and is powered from a nominal 120-V ac supply.

It is a standard linear power supply conveniently packaged with a protective cover of perforated metal, a six-foot flexible supply cord with 3-prong plug, input and output fuses, an overvoltage protector and an output terminal block. This package is attached to a flat plate designed to be mounted in a 19-inch relay rack or to be wall mounted.

Power supply features include:

- Both the input and output are fused with disposable cartridge-type fuses.
- The current limit/foldback circuit will automatically reduce the output current and voltage to a safe low level if the current goes above 4 A due to a short or other malfunction in the load. The current and voltage will remain at these low levels until the problem in the load is corrected.
- Devices connected to the power supply are protected against overvoltage which might be caused by excessively high line-voltage spikes or a malfunction in the power supply. An overvoltage protector (OVP) is connected across the output and is adjusted to clamp at 27.0 V.

CHAPTER 2
INSTALLATION

2.1 UNPACKING

Unpack the power supply slowly and carefully; be sure to locate the user manual and discard any packing material.

2.2 MOUNTING

The power supply may be mounted in a 19-inch relay rack or to a wall. See Figure 2-1 below for mounting dimensions.

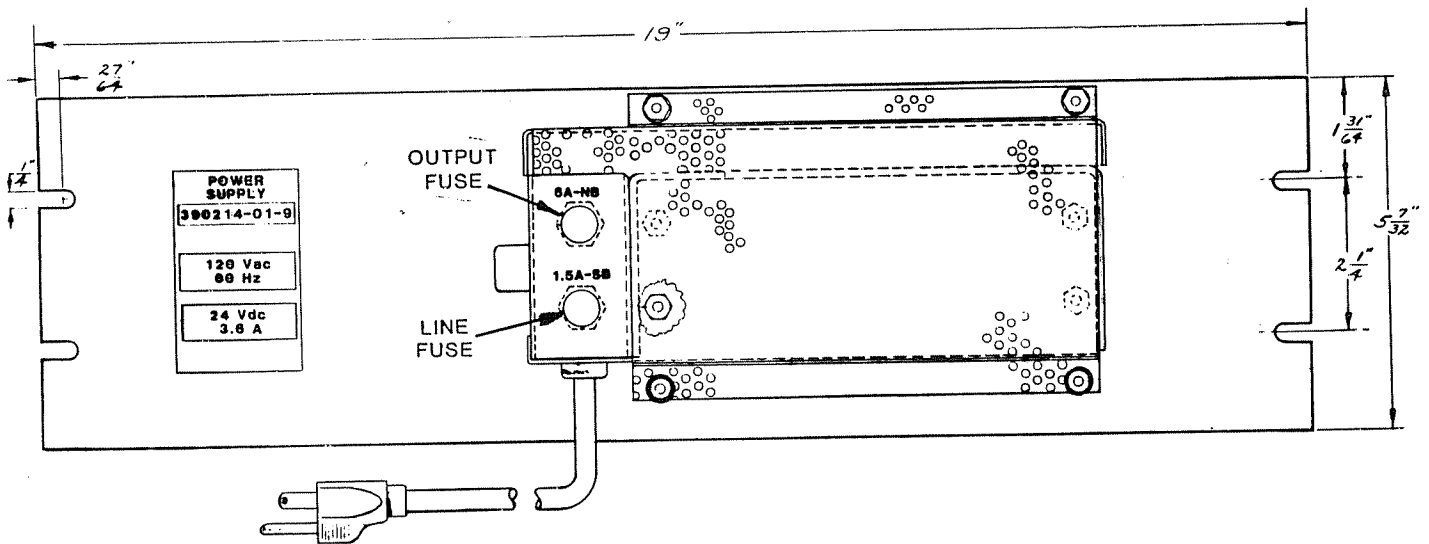


Figure 2-1. Front View, Mounting Dimensions

2.3 POWER CONNECTION

Connect the power line-cord to an appropriate 120-V ac, 60 Hz power source. The power receptacle should be the three-wire grounded type and should make good contact with the grounding blade of the power-cord plug. This will provide a safety ground for the power supply chassis and all exposed metal parts.

2.4 GROUNDING TERMINAL

A separate grounding terminal is provided on the outside of the enclosure. It is the third terminal on the 24-V output terminal block - see Figure 2-2 below. This terminal should be connected to an approved earth ground if there is any question concerning the integrity of the power-cord ground or if it is required by the local code authorities. The terminal is connected internally to the same points as the power-cord ground wire. The terminal block has No. 8 screws and is suitable for No. 14 AWG wire.

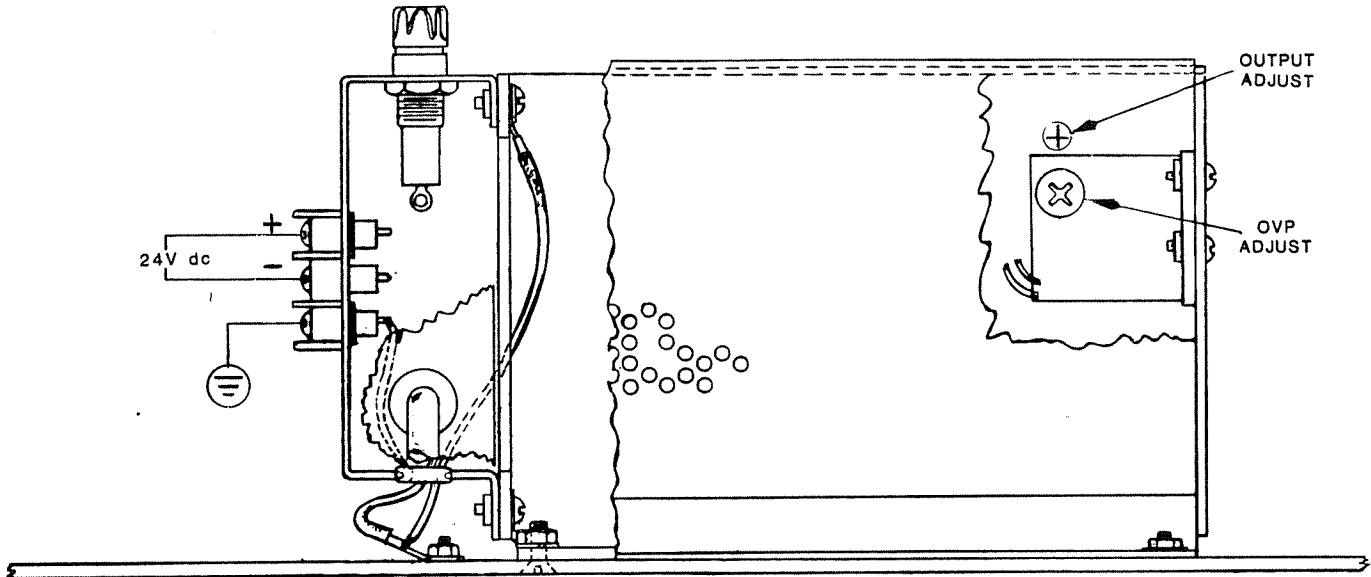


Figure 2-2. Bottom View, Power Supply

2.5 PRELIMINARY POWER SUPPLY CHECK

- (1) Apply ac power to the supply.
- (2) Check power supply output at the 24-V terminal block with a digital voltmeter. The output (without a load) should read 24.0 ± 0.05 V dc.
- (3) The power supply comes factory adjusted and no further adjustment should be necessary. If adjustment is needed or if a slightly different output voltage is desired, refer to the procedures in Chapter 3, Service.

2.6 DC OUTPUT CONNECTIONS

The 24-V connections are made to the two terminals marked + and - on the terminal block located on the side of the supply - see Figure 2-2.

CHAPTER 3

SERVICE

3.1 GENERAL

Refer to Figure 3-1 below for help in understanding the service procedures.

In general, there are only three service procedures that can be readily performed in the field:

- (1) Check the input and output fuses and replace if required.
- (2) Adjust the clamping point of the overvoltage protector (OVP). It may be adjusted from a point about one volt above the supply output voltage to as high as 32 V. It is factory set at 27.0 V.
- (3) Adjust the output voltage of the supply; although the voltage is factory set at 24.0 V, it can be adjusted $\pm 5\%$.

WARNING

Procedures (2) and (3) should be done only by qualified service personnel. The protective cover must be removed during these procedures, thus exposing hazardous electric potentials.

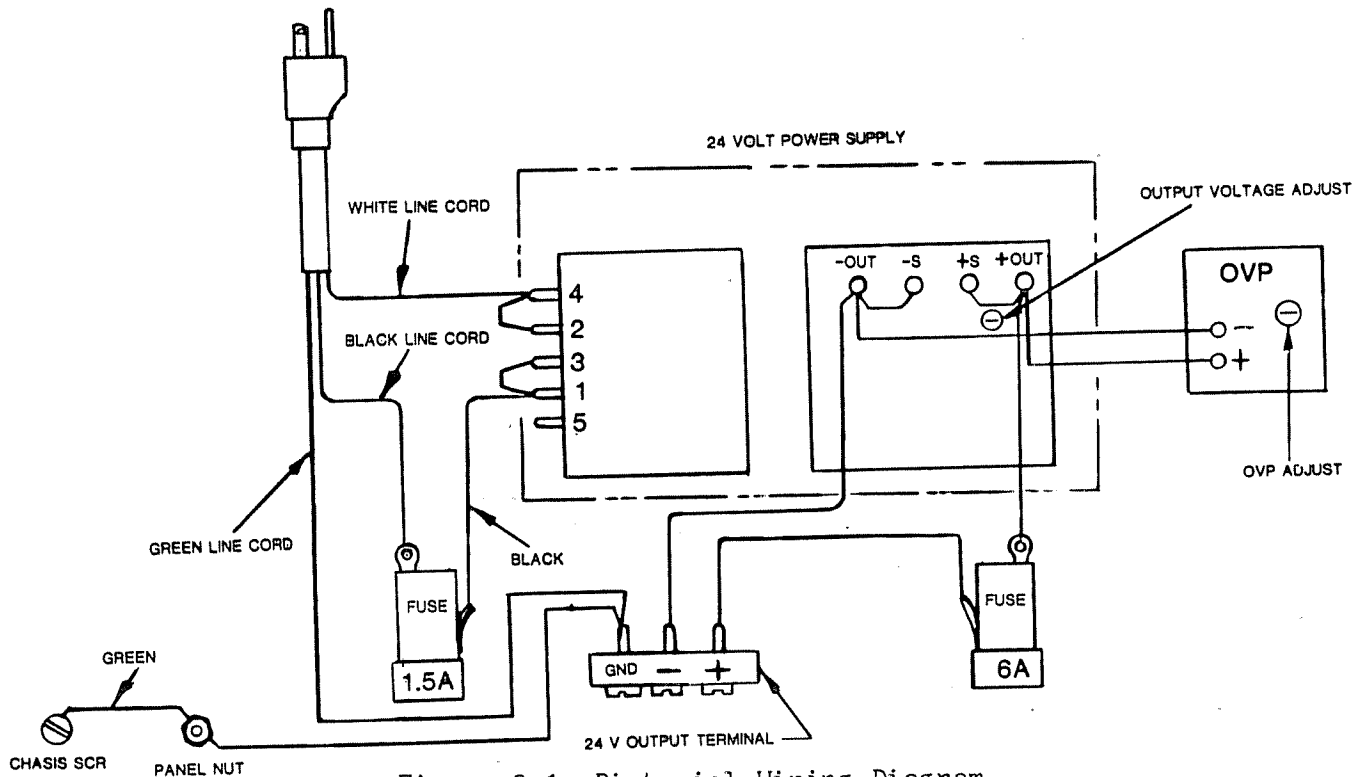


Figure 3-1. Pictorial Wiring Diagram

3.2 TROUBLESHOOTING

3.2.1 NO OUTPUT

If the unit fails to produce the proper power output, check the voltage at the 24 V output terminals. If it is zero, disconnect the load. If the output continues to be zero, the most likely cause is a blown fuse. Remove each fuse, check its continuity and replace if necessary. Be sure the fuse is the correct physical size (3 AG) to make proper contact in the fuse holder. Also, be sure that the 1.5 A and 6 A fuses are in the correct holders.

3.2.2 LOW OUTPUT

When the load on this supply is increased, the output voltage will remain relatively constant until the current reaches approximately 4 A. If the load is increased further, the foldback circuit will begin to function and the output voltage and current will start to drop. The voltage will gradually approach zero as the load approaches a full short. Thus if a voltage check shows the output to be between 0 and 24 V, an overload can be suspected. This will be confirmed if the voltage goes back to 24 V when the load is disconnected.

The load should be examined to determine why it is drawing excessive current. If no problem can be found in the load, the power supply can be checked further to see whether foldback is occurring too soon. This can be done by monitoring the voltage and current output as the current is increased using suitable resistors for the load. If the voltage drops significantly before the current reaches 3.6 A, the foldback circuit is defective and the unit should be returned to the factory for repair or replacement.

3.2.3 OUTPUT LESS THAN 1 VOLT

The overvoltage protector (OVP) is connected across the output terminals and is adjusted to clamp at 3.0 V above the normal output voltage of 24.0 V. If the OVP becomes activated, it produces a nearly complete short across the output and this in turn activates the foldback circuit. The voltage at the output terminals will read between 0.6 and 0.8 V. If a voltage reading of this magnitude is observed, it could be due to a severe overload or to the OVP. Disconnect the load. If the output goes back to 24 V, the problem was due to overload. If the output remains at 0.6 to 0.8 V, the OVP is activated. Once activated the OVP will remain clamped until the ac power is removed momentarily. If removal and reapplication of the ac power produces a normal 24 V output, the problem may have been caused by a transient high-voltage spike and no further action is required.

The problem may be that the actuation point of the OVP is set too close to the output voltage; in that case, check the setting of the OVP using the procedure in Section 3.3.1.

3.3 CALIBRATION

3.3.1 NORMAL CALIBRATION PROCEDURE

Two adjustments are used to calibrate this supply. The output voltage adjustor is located on the main PC board - refer to Figure 2-2. Clockwise rotation increases the output voltage.

The OVP adjustor is located on the small PC board bolted to the side wall of the supply (see Figure 2-2). Clockwise rotation increases the actuation point; it can be adjusted from just above the output voltage setting up to a maximum of about 32 V. The output voltage can be adjusted at least $\pm 5\%$ from the 24 V nominal output (and some units can be adjusted by as much as ± 10 or 15%).

Use the following procedure to recalibrate the supply to its original factory settings:

- (1) Remove ac power.
- (2) Remove screen cover.
- (3) Turn OVP pot fully CW.
- (4) Apply ac power.
- (5) Connect digital voltmeter to output terminals.
- (6) Adjust voltage output to 27.0 ± 0.1 V dc.
- (7) Now turn the OVP adjustment CCW until the power supply output drops below 1 V (OVP has clamped).
- (8) Remove ac power. Turn output voltage pot fully CCW.
- (9) Turn ac power on and adjust output voltage (without a load) to 24.0 ± 0.05 V dc.
- (10) Remove ac power.
- (11) Replace screen cover.

3.3.2 SPECIAL CALIBRATION PROCEDURE

The procedure in Section 3.3.1 requires only a voltmeter and a small screw driver. If you want to set the OVP at a point above 27.0 V and/or the output significantly above 24.0 V, it may be necessary to use an external power supply which can produce a dc voltage above 27.0 V and has current foldback protection; in this case, use the following procedure:

- (1) Remove ac power.
- (2) Remove screen cover.
- (3) Turn OVP pot fully CW.
- (4) Connect the external supply output to the output terminals of the Bristol Babcock supply, plus to plus and minus to minus.
- (5) Also connect a digital voltmeter to these same output terminals.
- (6) Apply ac power to the external supply but not to the Bristol Babcock supply.
- (7) Adjust the voltage output of the external supply to the desired OVP setting. (It should be at least 10% above the desired supply output).
- (8) Now turn the OVP adjustment CCW until the power supply output drops below 1 V (OVP has clamped).
- (9) Remove ac power from external supply; disconnect it from the Bristol Babcock supply and set aside.
- (10) Apply ac power and adjust output voltage to 24.0 V or other desired voltage.
- (11) Remove ac power.
- (12) Replace screen cover.

CHAPTER 4
SPECIFICATIONS

Power Input:

120 V ac \pm 10% (108 to 132 V ac), 60 Hz
160 VA maximum at full load
Three-wire power cord with 1.5 A 3AG slow-blow fuse

Output:

24.0 \pm 0.05 V dc (factory adjusted) at 3.6 A maximum (86.4 W).

Ripple Voltage:

48 mV peak to peak, maximum.

Regulation of 24 V Output:

Load: 100 mV change for 50% load change.
Line: 100 mV change for 10% input change at 3.6A.

Ambient Temperature Limits:

Operating: 0 to 50°C
Storage: -55 to 85°C

Temperature Coefficient:

8 mV/°C maximum.

Humidity:

0 to 90% RH (0 to 50°C) noncondensing.

Cooling:

Natural convection.

Isolation:

Both 24-V output terminals are isolated from the grounded case and from the ac input.

Stability:

\pm 72 mV for 24 hours after warm up.

Output Protection:

6 A 3AG normal-blow fuse.

Protected against overload on short circuit by continuous current limit/foldback circuit which operates above 4 A.

Overvoltage protector set to clamp at 27.0 ± 0.5 V dc.

Vibration Limits:

0.5 "g" maximum at 15 to 150 Hz