tellabs
technical manual
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rev D

practice section 838001

8001 24/48Vdc Power Supply

(Recognized under the Component Program of Underwriters Laboratories Inc.)

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1. general description

1.01 The Tellabs 8001 Power Supply (figure 1) provides a filtered, well-regulated, low-ripple, 1 ampere source of 24 or 48Vdc power. The 8001 derives its output from conventional 117Vac, 60Hz input. Selection of 24 or 48Vdc is made via a slide switch at the rear of the unit.

1.02 The 8001 incorporates a unique, fast-acting current foldback circuit that protects the internal regulator circuitry and external circuits against overloads, including both momentary and prolonged output short circuits. The foldback circuit quickly senses an output overload condition and reduces the output current to a few milliamperes. After the foldback circuit has been activated, the circuit repetitively tests for removal of the output overload, and when the overload condition has been removed, normal output voltage is reestablished. The foldback circuit will automatically restore normal output voltage within about 10 seconds of removal of the overload condition, so long as the load current after restoration is under 1.2 amperes.

1.03 The 8001's output is floating, allowing either the positive or negative terminal to be grounded. This permits two 8001's to be connected in series to obtain a 72 or 96Vdc output.

1.04 A fast-blow input fuse protects the 8001 Power Supply from overload conditions on the ac power line.

1.05 The 8001 is designed for either apparatus case or relay rack (via mounting bars) installation.

1.06 The 8001 Power Supply is housed in a cadmium-plated steel case and is supplied with a 10-foot, three-conductor input power cord.

1.07 Features of the 8001 include switchable selection of 24 or 48Vdc output power; a unique foldback circuit for protection against output short circuits and overloads; heat sinking of the regulating transistor to chassis and housing for better heat dissipation and longer life; and highly regulated, low-ripple output.

2. application

2.01 The 8001 Power Supply is a general purpose power source, designed with specific relevance to

figure 1. 8001 Regulated Power Supply

telephone applications. The 8001 is generally used in customer-premise or other applications where battery plant is impractical, but it may also be used as a convenient source of ±24 or ±48Vdc power in the Central Office.

2.02 The well-regulated output of the 8001 makes it suitable for many small-load telephone applications, including use as talk battery. Because of the floating output of the 8001, two of these units may be connected in series to obtain 72 or 96Vdc — as required, for example, in long line applications.

2.03 The 8001 will provide up to 1 ampere of current in either 24 or 48Vdc mode. When more than 1 ampere is drawn, the protective circuit of the 8001 is activated, and the unit shuts down all output except for a small sensing current until the overload condition is removed.

2.04 The 8001 may be located anywhere conventional 117Vac power is available. The 8001 will function within a temperature range of 20° to 120° F, humidity to 95%, with no condensation.

3. installation

inspection

3.01 The 8001 Power Supply should be visually inspected upon arrival in order to find possible damage incurred during shipment. If damage is noted, a claim should immediately be filed with the carrier. If stored, the Power Supply should be inspected again prior to installation.

mounting

3.02 The 8001 Power Supply is designed to mount in standard apparatus case dimensions.

Mounting ears at the top and bottom of the Supply are secured to the mounting framework of the apparatus case by four screws. In relay rack installations, mounting bars must be provided to install the 8001. Up to six 8001 Power Supplies may be mounted across a 19 inch relay rack. A 23 inch rack will accept seven Supplies. In either case, four mounting spaces (7 vertical inches) are utilized.

installer connections

3.03 Before connecting any leads to the 8001, ensure that input power is **not** applied to the unit and that the voltage-selection switch on the back of the unit is set to the **OFF** position. When these items are verified, connect the power leads to the appropriate output terminals as directed in paragraph 3.04. Three screw-type output terminals are provided: positive, negative and ground.

3.04 Connect positive and negative leads to their respective terminals. Either the positive or the negative terminal may be connected to the ground terminal. Because the 8001 is intended primarily for telephone applications, which are usually characterized by positive power grounding, the unit is shipped from the factory with a metallic clip in place between the ground and positive output terminals. If a floating output is desired, or if the negative terminal is to be grounded, this metallic clip must be removed.

3.05 After output wiring is completed **but before power is applied to the unit**, verify that the voltage selection switch is in the **OFF** position and that the power output leads are properly dressed. (This will reduce the possibility of an inadvertent short circuit.) Then plug the input power cord into a 117Vac (nominal), 60Hz, single-phase receptacle. Set the selection switch to either *24V* or *48V*, as desired, and verify that the proper output voltage is present.

4. circuit description

4.01 Output voltage of the 8001 Power Supply is selected by operation of a slide switch located immediately above the output terminals on the rear of the supply. Control of output voltage is achieved by switching voltage taps on the secondary of the isolation transformer and the output voltage sense point that provides one input to a differential comparator.

4.02 Power transformer T1 provides voltage translation and isolation between the 117Vac (nominal) input and the rectifier and regulator circuitry on the transformer secondary. The secondary of T1 is tapped to accommodate either 24 or 48Vdc output. Following rectification by a full-wave bridge rectifier and filtering, a series voltage regulator provides output voltage essentially independent of load currents from 0 to 1 ampere.

4.03 Output regulation is achieved through the comparison of a portion of the output voltage to a stabilized reference potential in a high-gain differential comparator. The comparator output is amplified and coupled to a current driver and then to the regulator transistor. The use of current amplification assures low dynamic output impedance and low output ripple.

4.04 The series regulator in the 8001, and external circuits as well, are protected by a unique current/voltage foldback circuit that turns the regulating transistor off when output current increases above a safe operating level (approximatley 1.2A). Additionally, a fast-acting shutdown circuit turns the pass device off quickly (in about 1 millisecond) if the output voltage suddenly decreases due to external conditions, such as a short circuit or very low resistance across the output. The regulator will remain off until the overload condition is removed, and will automatically reset to normal output voltage within 10 seconds after the overload is removed. If the load current does not exceed 1.2 amperes, the foldback circuit is deactivated and the supply returns to normal service. If current exceeds 1.2 amperes, foldback is reactivated. Prolonged output short circuits will not harm the 8001.

6. specifications

input voltage range
105 to 130Vac rms, 57 to 63Hz, single phase

output
24 or 48Vdc, switchable, 1 ampere maximum current

regulation
±1.0 volt, no load to full load, low line to high line

ripple
2mV rms typical; 5mV rms maximum, measured at full load and low line voltage

output protection
current/voltage foldback, activated at approximately 1.2 amperes output current

short circuit protection
will tolerate output short circuit of any duration

polarity
either positive or negative output terminal can be referenced to ground

fusing
line fuse, 1.5 ampere

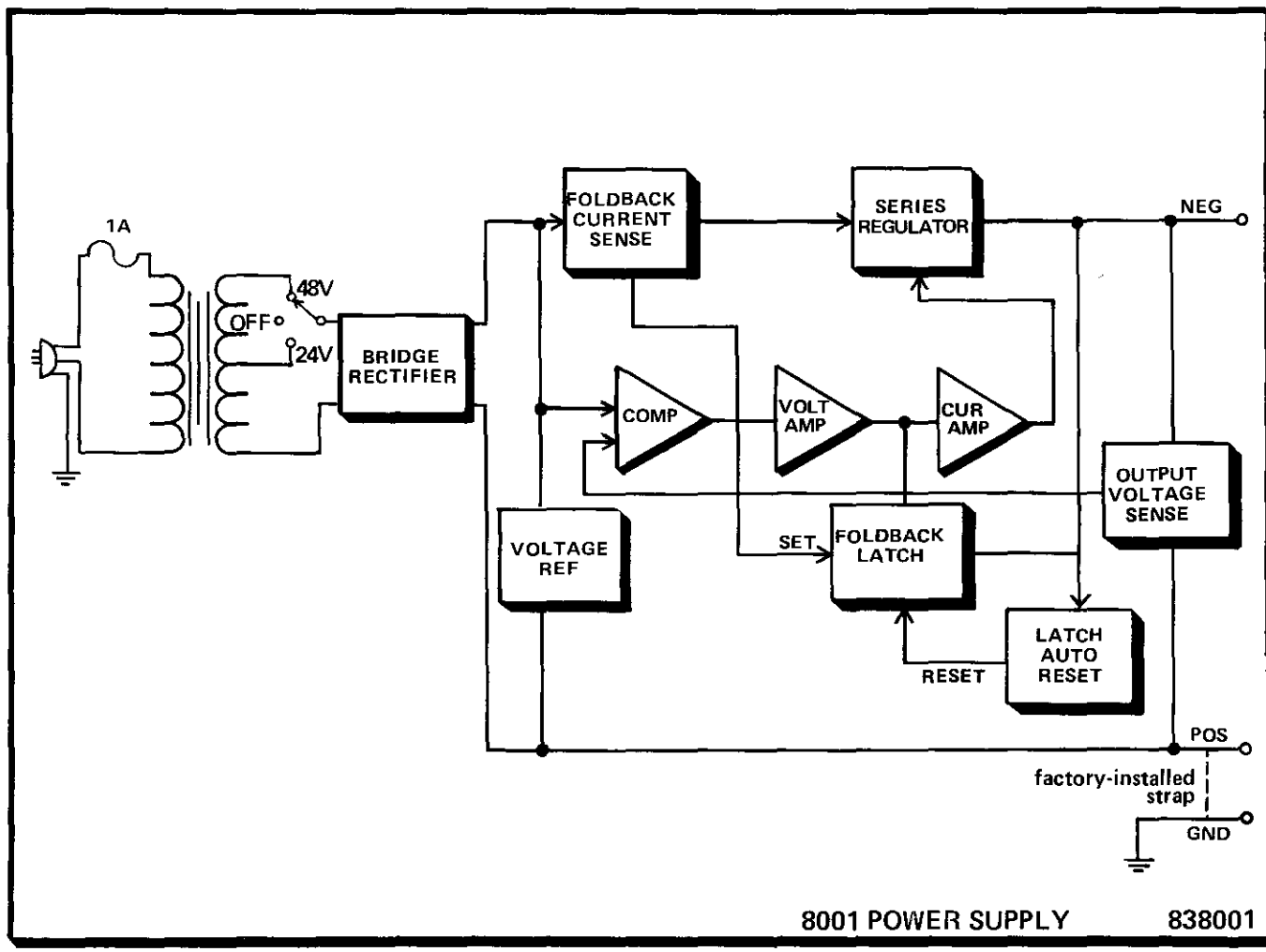
operating environment
20° to 120°F (−7° to 49°C), no load to full load, low line to high line (humidity to 95%, with no condensation)

weight
approximately 7 lbs.

dimensions
6.90" (17.53cm) high (including mounting ears)
2.88" (7.30cm) wide
7.00" (17.78cm) deep

7. testing and troubleshooting

7.01 This Testing Guide may be used to assist in the installation, testing, or troubleshooting of the 8001 Power Supply. The Guide is intended to verify proper operation or to localize trouble to either the Power Supply or external circuitry. If a Supply is suspected of being defective, a new Supply should



5. BLOCK DIAGRAM

be substituted and the test conducted again. If the substitute Supply operates correctly, the original Supply should be considered defective and returned to Tellabs for repair or replacement. It is strongly recommended that no internal (component-level) testing or repairs be attempted on the 8001 Power Supply. Unauthorized testing or repairs may void the Supply's warranty.

7.02 If a situation arises that is not covered in the Testing Guide, contact Tellabs Customer Service at (312) 969-8800 for further assistance.

7.03 If an 8001 Power Supply is diagnosed as defective, the situation may be remedied by either *replacement* or *repair and return*. Because it is the more expedient method, the *replacement* procedure should be followed whenever time is a critical factor (e.g., service outages, etc.).

replacement

7.04 If a defective 8001 is encountered, notify Tellabs via telephone, letter or twx. Notification should include all relevant information, including the 8X8001 part number (from which we can determine the issue of the Supply in question). Upon notification, we shall ship a replacement Supply to you. If the warranty period of the defective Supply has not elapsed, the replacement supply will be shipped at no charge. Package the defective Supply in the replacement Supply's carton; sign the packing list included with the replacement Supply and enclose it with the defective unit (this is your return authorization); affix the preaddressed label provided with the replacement Supply to the carton being returned; and ship the equipment prepaid to Tellabs.

repair and return

7.05 Return the defective 8001 Power Supply, shipment prepaid, to: Tellabs Incorporated
4951 Indiana Avenue
Lisle, Illinois 60532
Attn: repair and return dept.
Enclose an explanation of the Supply's malfunction. Follow your company's standard procedure with respect to administrative paperwork. Tellabs will repair the Supply and ship it back to you. If the Supply is in warranty, no invoice will be issued.

Testing Guide Checklist on page 4.

testing guide checklist

test	procedure	normal result	if normal conditions are not met, verify:
Output voltage	Connect VOM set to 50Vdc scale to output terminals.	24 or 48Vdc ±1Vdc present ☐.	Supply plugged into active 117 Vac outlet ☐. Line fuse ☐. Connections at output terminals ☐. Load current under 1 ampere ☐. Input voltage within specs ☐. Replace Supply and retest ☐.
Output current	Connect VOM capable of reading 2 amperes in series with load.	Current up to 1.20 amperes present at either 24 or 48Vdc ☐. (Maximum current varies with temperature. Up to 1.5 amperes may be passed at low ambient before protective circuit latches.)	Input power ☐. Line fuse ☐. Connections at output terminals ☐. If greater than 1.5 ampere current registered, protective circuit may be inoperative; substitute new Supply and retest ☐.
Ripple	Connect dc-blocked, sensitive ac voltmeter or scope across output terminals.	Measure 5mV rms or 14mV peak-to-peak maximum ripple ☐.	Replace Supply and retest ☐.

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