

8050 Power and Ringing Supply

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1. General/Applications

- 1.1 The 8050 Power and Ringing Supply provides either filtered, regulated 24VDC at 2.5 amperes, or filtered, regulated 48VDC at 1.25 amperes, as selected via switch option. The 8050 also supplies 12 watts of sinewave ringing power (nominal 96VAC at either 20 or 30Hz, switchable) and nominal 10VAC at 700mA for powering key telephone lamps.

Note: The 8050's 10VAC output is unregulated. Using this output for any purpose other than driving key telephone lamps is not recommended.

- 1.2 The 8050 operates on nominal 120VAC commercial line voltage at 50 or 60Hz and requires a maximum of 1.5A of current. This unit can be used to provide DC power and AC ringing and lamp voltages for any type of telephone equipment.
- 1.3 The 8050's output terminals are located on a 7-position screw terminal barrier strip on the rear of the unit. Also located on the rear of the 8050 are the line cord and two slide switches. One switch selects 24 or 48VDC output, the other selects 20 or 30Hz ringing. The front panel of the unit contains a green pwr (power) indicator LED for the DC portion of the supply and also serves as a heat sink.
- 1.4 The 8050 is shipped with mounting ears installed for key telephone unit (KTU) type mounting. Removal of the mounting ears allows the unit to be mounted in a Tellabs Type 10 mounting shelf, where it occupies two module positions.
- 1.5 The 8050 has floating outputs. Its DC output can therefore be used to supply either negative or positive ground referenced DC voltage. The DC and ringing output can float up to ± 150 volts away from ground, which may be useful in applications involving loop extenders or the like. The unit can also be wired for battery biased ringing, as described in the Installation section of this practice — Section 2. If necessary, the DC outputs of two or more 8050s can be connected in series to provide increased DC voltage output. Either terminal of the ringing and 10VAC lamp outputs can be grounded to provide a fixed reference.

Revision Notice

- 1.6 This practice has been revised to:
 - change the commercial line voltage from 117VAC to 120VAC
 - change paragraphs 3.2 and 3.8 to reflect that the EMI filter reduces converter noise, rather than eliminates it
 - and to correct the line conducted emissions FCC specification in Section 5 from FCC Part 15J to FCC Part 15B
 - add safety specifications to Section 5

2. Installation

Inspection

- 2.1 Inspect all equipment upon its arrival to detect any possible shipping damage. If damage is found, immediately file a claim with the carrier. If the equipment has been stored, re-inspect it prior to installation.

Mounting

- 2.2 Ventilation is of primary importance when choosing a location for the 8050. Air entry at the bottom of the unit and air exit at the top must be unobstructed. Incoming air at the bottom of the unit must be cooler than 122°F (50°C). Choose a location with at least 0.5 inch of clearance at the top and bottom. Stacking of 8050s without these clearances is not recommended, because this raises internal temperatures and may shorten the life of certain components. Do not mount the 8050 upside down.
- 2.3 The 8050 can be mounted in a KTU apparatus case or relay rack, or installed in a Type 10 mounting shelf, as described below:
 - **KTU apparatus case and relay rack mounting**
 - The 8050 can be mounted in a standard apparatus case by using the four screws provided to secure the unit's top and bottom mounting ears to the framework of the apparatus case. In relay rack installations, mounting bars must be provided. Up to six 8050s can be mounted across a 19-inch relay rack. A 23-inch rack accepts up to seven units across. In either case, four rack mounting spaces (7 vertical inches) are required.
 - **Type 10 shelf mounting**
 - Remove the 8050's mounting ears and store or discard both the ears and the screws. Remove the screw from the center of the rear panel and use it to install the hold-in latch provided, as shown in Figure 2-1. Then, using the sheet metal projections along the top and bottom to engage the card guides, slide the 8050 into the shelf until it snaps into place.

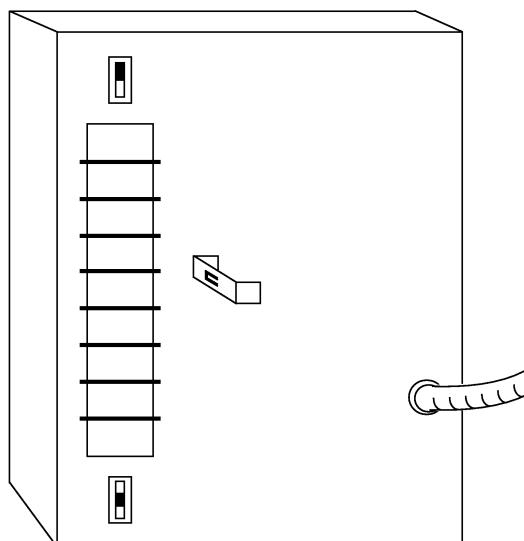


Figure 2-1 *Hold-in Latch Installation*

Connections

Note: When the 8050 is mounted in a Type 10 mounting shelf, be sure that the rear of the shelf is open to allow access to the AC power cord and DC power/ringing wires.

- 2.4 Before plugging the 8050's power cord into an AC receptacle, ensure that all necessary connections are made to the 8050 and to all equipment to be powered. Also ensure that both option switches on the 8050 are properly set. All output connections to the 8050 are made to the 7-position screw terminal barrier strip on the rear of the unit. Make all output connections in accordance with Table 2-1, paragraphs 2.5 and 2.6, and Figures 2-2 and 2-3. Wire of 20AWG or heavier is recommended.

connect:	to terminal designation (location):
ground	gnd (terminal 1)*
+24 or +48VDC output	+DC (terminal 2)
–24 or –48VDC output	–DC (terminal 3)
10VAC output	lamp (terminal 4)
10VAC output	lamp (terminal 5)
ring gen output common	ring common (terminal 6)
ring gen output	ring hot (terminal 7)
*This terminal is internally connected to the 8050's chassis.	

Table 2-1 *Connections to 8050*

Fusing for Multiple Circuits

- 2.5 When powering multiple circuits, individual modules or groups of modules should be separately fused. The Tellabs 9021 Fuse Module (or equivalent) is recommended.

Connections for Negative DC Output and Negatively Biased Ringing

- 2.6 The DC and ringing supply portions of the 8050 can be connected in series to provide DC battery biased ringing. The connections required for negative DC output and negatively DC battery biased ringing, which is the most common arrangement in telephony applications, are shown in Figure 2-3.

Note: If your application requires positive DC output voltage and/or positively DC battery biased ringing, consult your company's circuit engineering department or your Tellabs regional office for assistance.

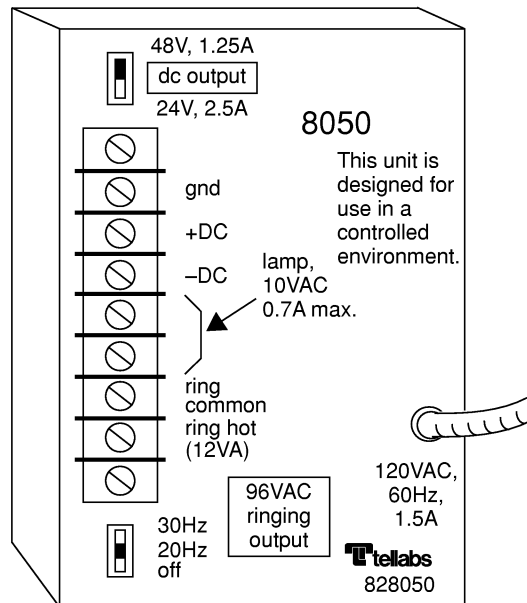
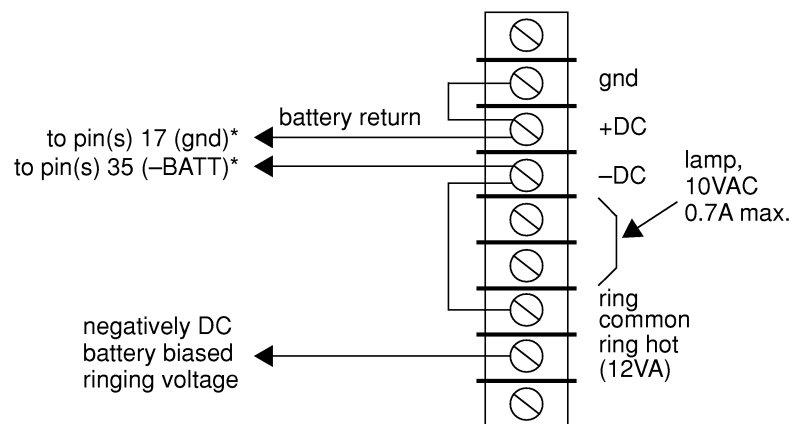


Figure 2-2 Rear View of 8050 (Showing Terminals)



*on Tellabs or equivalent module(s) to be powered

Figure 2-3 Connections for Negative DC Output and Negatively DC Battery Biased Ringing Voltage

Powering the 8050

- 2.7 Before plugging in the 8050's power cord, the two option switches on the rear of the unit must be set. Perform the following steps to power the 8050:
 1. Set the DC output switch to either 24 or 48VDC, as required.
 2. Set the 96VAC ringing output switch to off, for safety.
 3. Plug the power cord into its AC outlet and verify operation of the DC and 10VAC outputs.
 4. Disconnect the power cord and wait for the pwr LED to go completely off.
 5. Set the 96VAC ringing output switch to either 30 or 20Hz, as required.
 6. Reapply line power and verify the operation of all outputs.

Caution: Do not change the DC output switch setting unless power to the 8050 is removed and the pwr LED is completely off.

3. Circuit Description

- 3.1 This section will familiarize you with the 8050 for engineering and application purposes only. Attempts to troubleshoot the 8050 internally are not recommended and may void its Tellabs warranty. Troubleshooting procedures should be limited to those prescribed in Section 6. Refer to the Block Diagram as an aid in following this section — see Section 4.

DC Supply

- 3.2 The input circuit to the power converter includes an EMI (electromagnetic interference) filter to reduce converter noise that may reach the power cord. A transient suppressor connected across the line provides immunity to lightning-induced transients.
- 3.3 The AC line is directly rectified, and the resulting high voltage is fed to a 100kHz FET inverter that drives the unit's main power transformer.
- 3.4 The inverter transistors are driven by a pulse width modulator control circuit through an isolation transformer. This pulse width modulator continuously monitors the output voltage and current and adjusts the pulse width of its own output to maintain proper output voltage and limit the maximum current drawn from the DC output.
- 3.5 A small housekeeping power supply powers the pulse width modulator and isolates it from the line.
- 3.6 The main power transformer provides the same waveform to both rectified/filter circuits, resulting in optimum tracking between them. Individual DC voltages are determined by the turns ratio on the power transformer.
- 3.7 Operation at 24 or 48V is selected by connecting the two identical 24V outputs, either in series or in parallel, via the DC output switch. Each of these outputs is capable of delivering 1.25A of current. The series or parallel connection of identical power sources allows regulation and current limiting for both output voltage switch settings without re-adjustment of the control circuitry.
- 3.8 The 8050's DC output provides true current limiting (see Figure 3-1). As the loading is increased, output voltage begins to fall. If a dead short is placed across the DC output, current still flows continuously. The front panel pwr LED is powered from one of the 24V supplies. If the DC output is overloaded and voltage fails, the LED dims or goes out. The EMI filter at the DC output reduces power converter noise.

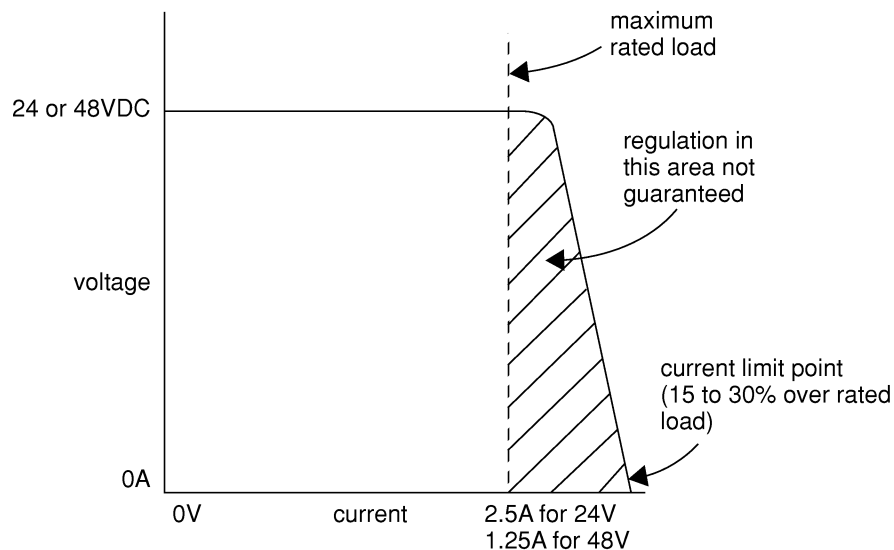


Figure 3-1 DC Output Current Limiting

Ringling Supply

- 3.9 Power to the ringing supply portion of the 8050 is derived from the main power transformer and is regulated by the same pulse width modulator circuit as the DC output. Note that the power source for the ringer collapses if the 24V/48V output is overloaded.
- 3.10 A regulator circuit provides low voltage to power an op-amp sinewave oscillator. The oscillator frequency is selected via the 96VAC ringing output option switch. The off position of the switch disables the sinewave oscillator.
- 3.11 The sinewave oscillator feeds a Class B amplifier, which provides the ringer output. The amplifier incorporates extensive protection for its output transistors, including bipolar foldback current limiting (see Figure 3-2). These features enhance the ringing supply's ability to drive resistive and resistive/capacitive loads, to carry DC current while driving loads, and to survive short-term faults to DC sources. Figures 3-3 through 3-7 are current voltage graphs that illustrate load handling characteristics.
- 3.12 The ringing supply output can float up to 150V from ground, provided that terminal 6 on the barrier strip (counting from the top) is within 150V peak of the metal case.

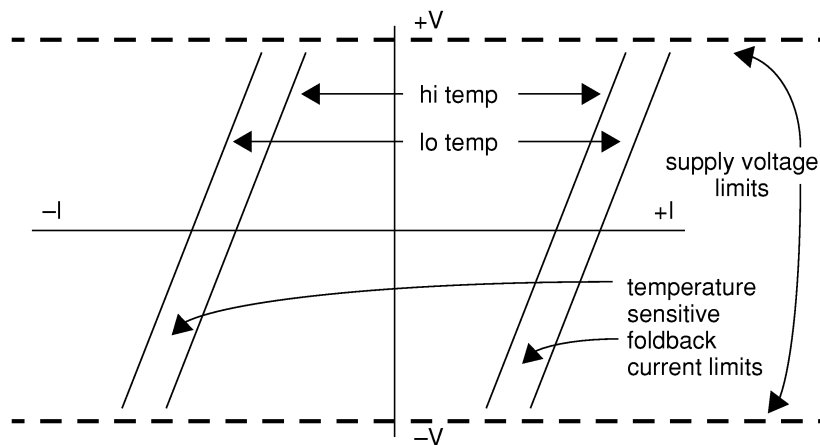


Figure 3-2 Ringling Supply Output Foldback Current Limiting

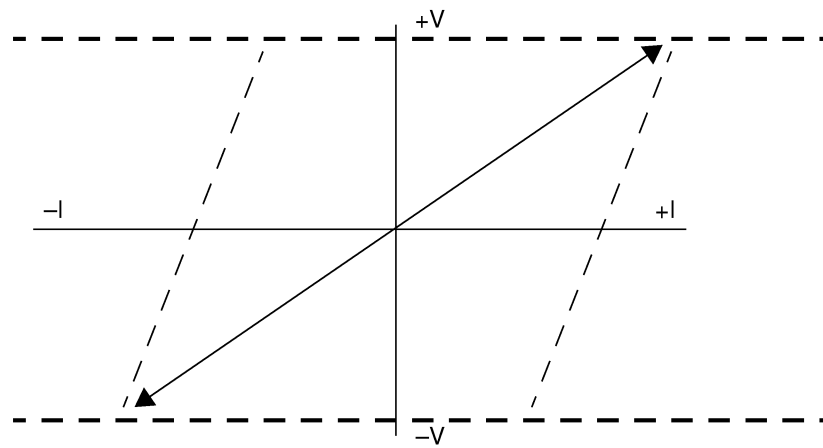


Figure 3-3 Ringing Supply Resistive Loading

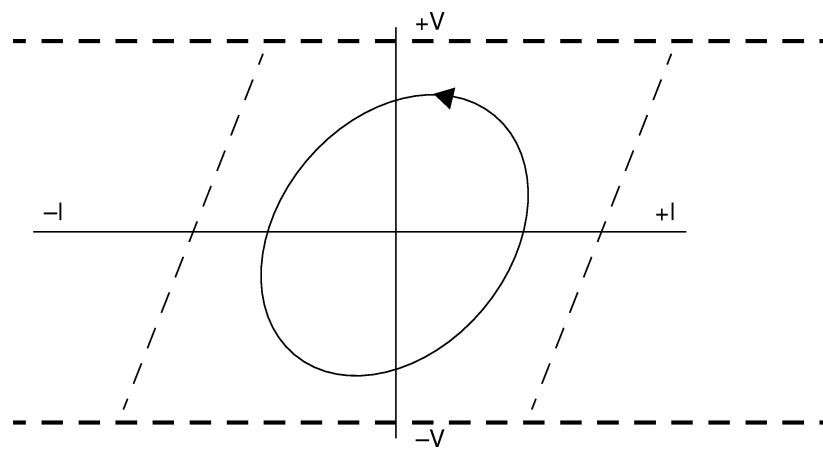


Figure 3-4 Ringing Supply Resistive/Capacitive Loading

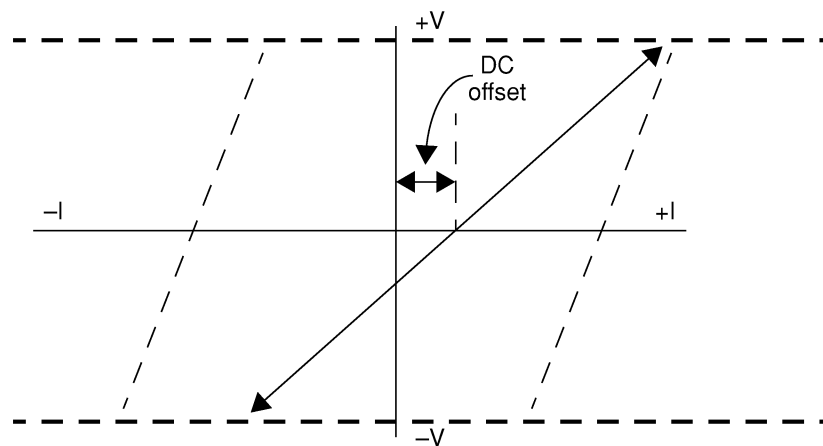


Figure 3-5 Ringing Supply Resistive Loading with DC Current

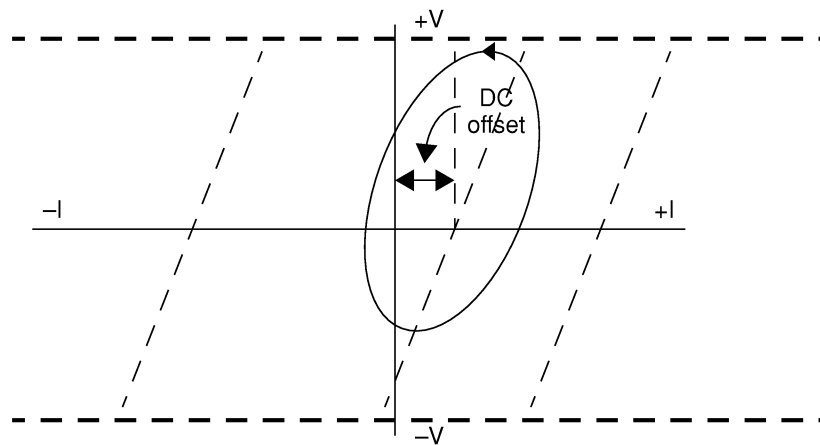


Figure 3-6 Ringing Supply Resistive/Capacitive Loading with DC Current

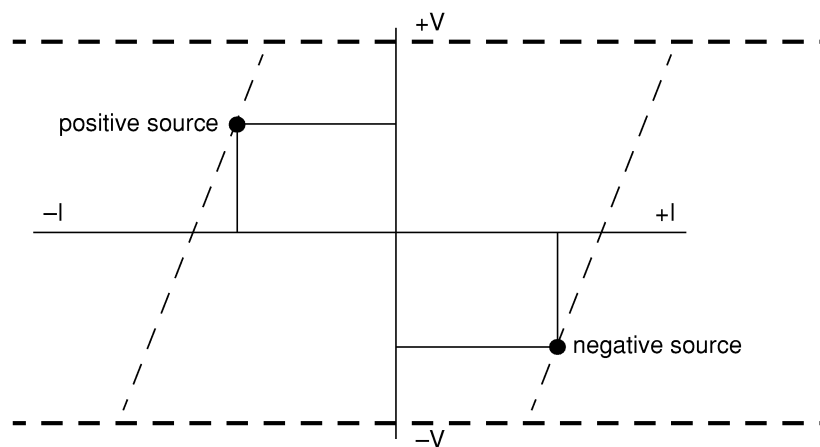
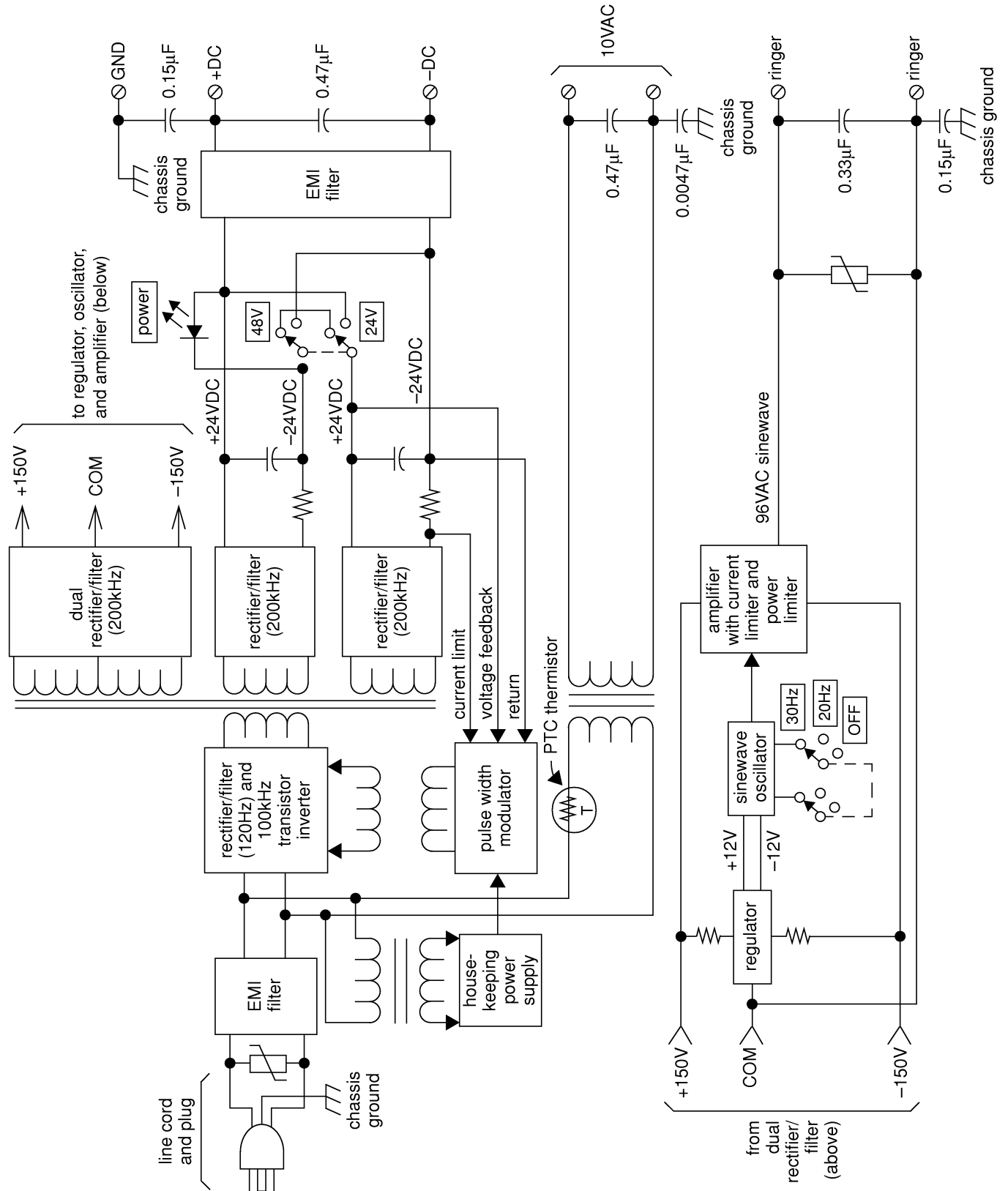


Figure 3-7 Ringing Supply Fault to DC Source

10VAC Lamp Output

- 3.13 The 10VAC lamp output circuitry comprises a positive temperature co-efficient (PTC) thermistor, a transformer, and output EMI filter capacitors. No regulation is provided.
- 3.14 The PTC thermistor operates in the self-heating mode and protects the transformer in the event of overloads. When current through the device reaches a threshold (partly determined by ambient temperature), its resistance rises rapidly. This limits transformer primary current and increases the self-heating action. At room temperature, the overload protection begins when load current reaches approximately 1.1A.
- 3.15 Thermistor recovery takes place when the load is reduced enough to allow cooling below the thermistor's switching temperature. At room temperature, the thermistor begins to recover when load current falls below about 0.3A.

4. Block Diagram



5. Specifications

Common

Line input power requirements	<ul style="list-style-type: none"> • 102 to 132VAC, 50 or 60Hz, 1.5A rms steady state, maximum
Line conducted emissions	<ul style="list-style-type: none"> • Meets FCC Part 15B, Class A (industrial/commercial) <p>Note: The input is protected from lightning-induced transients, per FCC Part 68.</p>
Safety	<ul style="list-style-type: none"> • Underwriters Laboratories (UL) 1459 (component recognition) • Canadian Standards Association (CSA) 22.2-234 (component recognition)

Physical

Mounting	<ul style="list-style-type: none"> • KTU apparatus case via brackets (supplied), or Type 10 mounting shelf
Dimensions	<ul style="list-style-type: none"> • 7 inches (17.8cm) high (including mounting ears) • 2.88 inches (7.3cm) wide • 6.25 inches (15.9cm) deep (including barrier strip)
Weight	<ul style="list-style-type: none"> • 3.25 pounds (1.48kg), including power cord and mounting ears

Environmental

Operating environment	<ul style="list-style-type: none"> • -4° to $+122^{\circ}\text{F}$ (-20° to $+50^{\circ}\text{C}$), humidity to 95% (no condensation)
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DC Supply

DC output	<ul style="list-style-type: none"> • $24 \pm 1.5\text{VDC}$ at 2.5A or $48 \pm 1.5\text{VDC}$ at 1.25A, switch selectable (overload protected at 1.10 to 1.40 times rated load)
DC output ripple and noise	<ul style="list-style-type: none"> • Less than 5mVrms to 50kHz • Less than 30dBnc • Less than 50mV peak to peak, including spikes, to 20MHz • No frequency component greater than 1mVrms, 3000Hz to 5MHz
DC output line regulation	<ul style="list-style-type: none"> • Less than 100mV with line varied from 102 to 132VAC

Ringling Supply

Output voltage	<ul style="list-style-type: none"> • Nominal 96VAC, 86Vrms minimum, 150V peak maximum (when switched off, output less than $\pm 0.5\text{V}$)
Output power	<ul style="list-style-type: none"> • Resistive load — 12W maximum • Resistive/capacitive load — 10W resistive, 48μF (30Hz) or 6μF (20Hz) capacitive (12VA total) <p>Note: Maximum duty cycle is 33% at maximum power and temperature.</p> <ul style="list-style-type: none"> • Frequency — $20 \pm 1\text{Hz}$ or $30 \pm 1\text{Hz}$, switch selectable
Sinewave distortion	<ul style="list-style-type: none"> • Less than 3%, with no frequency component greater than 0.5Vrms from 300 to 4000Hz
DC component of load (battery biased ringing)	<ul style="list-style-type: none"> • Continuous — 50mA maximum • Short-term fault — will survive application of up to 60VDC, either polarity, for up to 5 minutes
Ringling interruption	<ul style="list-style-type: none"> • None

Lamp Supply

Output voltage	• 10VAC nominal
Output current	• 700mA maximum
Line regulation	• None — proportional to line voltage
Load regulation with line at 120VAC	• V max = 11.8Vrms with no load • V min = 8.0Vrms with 700mA rms load
Overload protection	• Maximum temperature trip current — greater than 700mA • Maximum temperature recovery current — less than 120mA (lower temperature increases both values)

6. Troubleshooting, Technical Assistance, Repair and Return

6.1 Table 6-1 may be used to assist in the installation, testing, or troubleshooting of the 8050 Power Supply and is intended as an aid in the localization of trouble to this specific equipment. If the equipment seems to be defective, substitute new equipment (if possible) and test the substitute. If the substitute operates correctly, the original should be considered defective and returned to Tellabs for repair or replacement (see paragraph 6.3). If further technical assistance is required, refer to paragraph 6.2. We strongly recommend that no internal (component-level) testing or repairs be attempted on the equipment. Unauthorized testing or repairs may void its warranty. Also, if the equipment is part of a registered system, unauthorized repairs will result in non-compliance with Parts 15 and/or 68 of the FCC Rules and Regulations.

test	test procedure	normal result	if normal conditions are not met, verify:
Input power and pwr LED	Disconnect all 8050 outputs. Apply power and observe pwr LED.	pwr LED lights.	Supply plugged into active 120VAC outlet. No load at output. Replace power supply and retest.
DC output	Connect VOM (set to 50VDC scale) to DC output terminals. Measure voltage with DC output switch in both positions. Apply load to output and repeat measurements (1.25A for 48V, 2.5A for 24V).	DC output switch set to 24V: 24VDC \pm 1.5VDC.	Connections at output terminals. Input voltage within specs. Load current under 2.5A for 24VDC. Load current under 1.25A for 48VDC.
Lamp output	Connect VOM (set to VAC scale) to lamp output terminals. Measure voltage. Apply 700mA load and repeat measurement.	8.0 to 11.8VAC rms.	Input voltage. Load current under 700mA.
Ringing output	Connect VOM (set to VAC scale) to ring common and ring hot terminals. Apply at least a 10% load at DC output terminals (125mA for 48V, 250mA for 24V). Set 96VAC ringing output switch to either 20 or 30Hz and measure voltage. Apply a load of 1kohm (10W) at ringing output and repeat measurement.	86 to 106VAC rms.	Input voltage. Load resistance. Load capacitance too high.

Table 6-1 Testing Guide Checklist

Technical Assistance

6.2 Contact Tellabs Technical Assistance as follows:

Location	Telephone	FAX
Tellabs International, Inc., Sucursal Buenos Aires, Argentina	+541.393.0764, .0892, or .0835	+541.393.0732
Tellabs Pty Ltd., Milsons Point NSW, Sydney, Australia	+61.2.9966.1043	+61.2.9966.1038
Tellabs International, Inc., Rio de Janeiro, Brazil	+55.21.233.1604	+55.21.233.1604
Tellabs Comm. Canada Ltd., Mississauga, Ontario, Canada	905/858-2058	905/858-0418
Tellabs International, Inc., Beijing, China	+86.10.6501.1873	+86.10.6501.1871
Tellabs International, Santa Fe de Bogota, Colombia	+571.623.3162 or .3216	+571.623.3047
Tellabs International, Inc., Dubai, U.A.E.	+971.4.373250	+971.4.376526
Tellabs U.K. Ltd., Bucks, England	+44.1494.555800	+44.1494.555801
Martis Oy, Espoo, Finland	+358.0.502.771	+358.0.502.7815
Tellabs SAS, France	+33.1.345.20838	+33.1.309.60170
Tellabs GmbH, Munich, Germany	+49.89.54.90.05.+ext. or 0 (switchboard)	+49.89.54.90.05.44
Tellabs H.K. Ltd., Hong Kong	+852.2866.2983	+852.2866.2965
Tellabs GmbH Rep. Office, Budapest, Hungary	+36.1.2681220	+36.1.2681222
Tellabs International, Inc., Bangalore, India	+91.80.6610826	+91.80.6615908
Tellabs, Ltd., County Clare, Ireland	+353.61.703000	+353.61.703333
Tellabs de Mexico	525.282.1107, .1432, .1050, or .0981	525.282.0218
Tellabs Singapore Pte, Ltd., Singapore	+65.336.7611	+65.336.7622
Tellabs South Africa, Republic of South Africa	+27.12.665.0034	+27.12.665.0084
Tellabs International, Inc., Seoul, South Korea	+82.2.589.0667 or .0668	+82.2.589.0669
Tellabs Southern Europe s.a., Barcelona, Spain	+34.3.414.70.16	+34.3.414.69.25
Tellabs AB, Stockholm, Sweden	+46.8.678.4040	+46.8.678.4041
Tellabs International, Inc., Bangkok, Thailand	+662.642.7817	+662.642.7820
USA and Puerto Rico	(800) 443-5555*	630/512-7097
*All other Caribbean and South American locations, or if the toll-free number is busy, telephone 630/378-8800		

Repair and Return

- 6.3 If equipment needs repair, contact Tellabs' Product Services Department with the equipment's model and issue numbers and warranty date code. You will be issued a Material Return Authorization (MRA) number and instructions on how and where to return the equipment.

Location	Telephone	FAX
Martis Oy, Espoo, Finland	+358.0.502.771	+358.0.502.7815
Tellabs Comm. Canada Ltd., Mississauga, Ontario, Canada	905/858-2058	905/858-0418
Tellabs, Ltd., County Clare, Ireland	+353.61.703000	+353.61.703333
Tellabs Operations, Inc., Lisle, IL USA	(800) 443-5555 (USA and Puerto Rico only) 630/378-8800 (other International)	630/512-7097 (both)

- 6.4 Repair service includes an attempt to remove any permanent markings made by customers on Tellabs equipment. If equipment must be marked, it should be done with non-permanent materials and in a manner consistent with the correct handling of electrostatically sensitive devices.

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Tellabs Operations, Inc. 4951 Indiana Avenue, Lisle, Illinois 60532 Tel. (630) 378-8800 FAX (630) 512-7097