



INSTRUCTION MANUAL

MODEL 5015T SERIAL 810153

POWER DESIGNS INC.

1700 SHAMES DR. • WESTBURY, N. Y. 11590

TEL: 516-333-6200 TWX 510-222-6561

POWER DESIGNS PACIFIC INC.

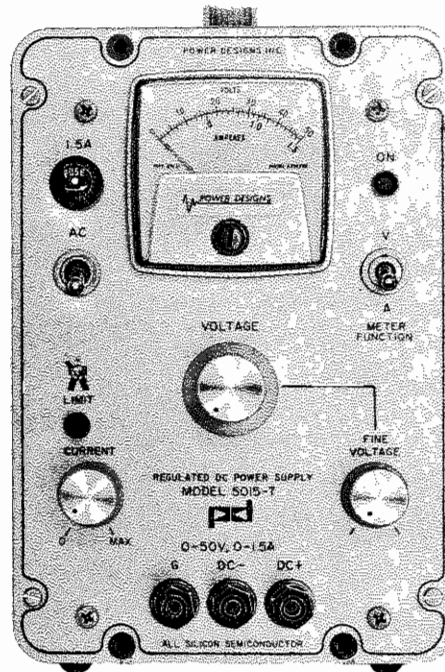
3381 MIRANDA AVE. • PALO ALTO, CAL. 94304

TEL: 415-493-6111 TWX 910-373-1251

MODEL 5015T

CONSTANT-VOLTAGE DC POWER SOURCE

0-50 VOLTS
0-1.5 AMPERES



The Model 5015T is a stable DC power source designed for laboratory, industrial, and electronic-system applications. Coarse and fine controls provide continuous adjustment over the entire output voltage range. A self-indicating current limiter permits output current control from zero to the maximum supply capability. Internal circuitry completely protects the instrument from overloads and short circuits. Rear terminals are provided for external voltage programming and remote sensing.

Design simplicity results in a portable instrument with high reliability under severe service conditions.

DESIGN FEATURES

- Continuously adjustable output voltage with coarse and fine controls; resolution of 10 MV.
- Continuously adjustable current limiting.
- Remote sensing.
- Remote programming.
- Automatic dissipation-limit control of internal power transistors.
- Series or parallel operation.
- Front and rear output terminals.
- All silicon semiconductors.
- Modular construction permits multiple-unit rack mounting. As many as three supplies may be mounted in a standard 8 3/4" x 19" rack. (See catalog sheet RPA-62 for rack-panel adapters.)
- Processed under Power Designs' "Predictable-Reliability" program for a 5-year MTBF. The program features: avalanche-controlled silicon rectifiers, stress-tested transistors, pre-aged zener references with extrapolated stability criteria based on 1/f noise changes, computer-grade capacitors, tin-oxide-film resistors, and components operated at 50% of manufacturers' published ratings. Units pre-aged under full-load conditions for a minimum of 50 hours.

POWER DESIGNS

MODEL 5015T

ELECTRICAL SPECIFICATIONS

OUTPUT

0-50 VDC, continuously adjustable, 0-1.5 AMPS.

limits after a step change (1-microsecond rise time) in rated load of 10 to 100% or 100 to 10%.

REGULATION

Better than 0.01%, or 3 MV, whichever is greater, for line-voltage variations of $\pm 10\%$ or 100% changes in rated load.

SOURCE IMPEDANCE

Less than 0.003 ohm at DC, 0.15 ohm at 100 KHz, 1.5 ohms at 1 MHz.

RIPPLE AND NOISE

Less than 250 μ V rms at 60-Hz line; less than 500 μ V rms at 400-Hz line.

FRONT-PANEL OUTPUT TERMINALS

Three insulated binding posts are provided for positive output, negative output, and chassis ground. Either output terminal may be grounded or the output may be left floating.

TEMPERATURE COEFFICIENT

0.02% plus 2 MV per $^{\circ}$ C.

STABILITY

Better than 0.01% plus 5 MV per 8 hours after warm-up, at constant line, load, and ambient temperature.

REAR-PANEL OUTPUT TERMINALS

Screw terminals are provided on a phenolic terminal strip for positive output, negative output, remote voltage programming, and positive and negative sensing.

OPERATING TEMPERATURE RANGE

0 $^{\circ}$ C to 60 $^{\circ}$ C

INPUT POWER

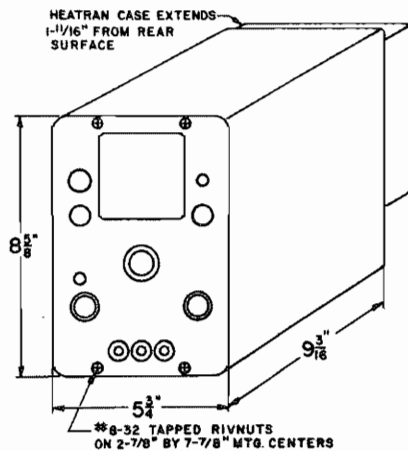
105-125 V, 55-440 Hz, 1 phase, 130 W*.

RECOVERY TIME

Less than 30 microseconds to return within regulation

*at nominal line voltage

DIMENSIONS



MECHANICAL SPECIFICATIONS

DIMENSIONS

5 3/4" x 8 5/8" x 10 7/8" deep behind front panel.

WEIGHT

14 pounds.

FINISH

Portable steel cabinet finished in blue vinyl enamel. Front panel is brushed, anodized aluminum with etched black lettering.

PRICE ~~325.00~~ \$259.00

FOB Westbury, N. Y.

Prices subject to change without notice.

POWER DESIGNS

SECTION 1
GENERAL DESCRIPTION

1.1 DESCRIPTION

The Model 5015T is a regulated DC power source suitable for use with laboratory and industrial instrumentation. It supplies 0 to 50 volts, 1.5 amperes and automatically limits the load current if an overload should occur. The current limiting point is adjustable at the front panel. Silicon semiconductors are used throughout for optimum temperature stability and reliability.

The unit is easily adapted for remote sensing (compensation for lead losses) or remote programming of the output voltage by making the appropriate connections at the rear panel terminal strip. A dissipation monitor* insures safe operation of the supply when remote programming is used.

The power supply is housed in a portable cabinet designed for bench use. Rack adapters are available for mounting up to three units in a 19" relay rack.

1.2 ELECTRICAL SPECIFICATIONS

INPUT: 105 to 125 volts, 55 to 440 Hz, 130 watts (at nominal line voltage).

OUTPUT: 0-50 VDC, continuously adjustable, 0-1.5 amperes.

REGULATION: Better than 0.01% or 3 millivolts, whichever is greater, for line voltage variations of $\pm 10\%$ or 100% changes in rated load.

RIPPLE AND NOISE: Less than 250 microvolts rms at 60 Hz line; less than 500 microvolts rms at 400 Hz line.

TEMPERATURE COEFFICIENT: 0.02% +2 millivolts per °C.

STABILITY: Better than 0.01% +5 millivolts per 8 hours after warm-up, at constant line, load and ambient temperature.

OPERATING TEMPERATURE RANGE: 0°C to 60°C.

RECOVERY TIME: Less than 30 microseconds to return to within regulation limits after a step change (1 microsecond rise time) in rated load of 10 to 100% or 100 to 10%.

SOURCE IMPEDANCE: Less than 0.003 ohm at DC, 0.15 ohm at 100 KHz, 1.5 ohms at 1 MHz.

PROGRAMMING RESISTANCE: 150 ohms per volt nominal.

* Patent applied for.

FRONT PANEL OUTPUT TERMINALS: Three insulated binding posts are provided for positive output, negative output and chassis ground. Either output terminal may be grounded or the output may be left floating.

REAR PANEL OUTPUT TERMINALS: Screw terminals are provided on a phenolic terminal strip for positive output, negative output, remote voltage programming and positive and negative sensing.

1.3 MECHANICAL SPECIFICATIONS

DIMENSIONS: 5-3/4" x 8-5/8" x 10-7/8" behind front panel.

WEIGHT: 14 pounds.

FINISH: The unit is housed in a portable steel cabinet finished in blue vinyl enamel. The front panel is brushed, anodized aluminum with etched black lettering.

SECTION 2
INSTALLATION AND OPERATION

2.1 GENERAL

No preliminary inspection or processing is required. The power supply is ready for operation as shipped from the factory.

2.2 PRELIMINARY PROCEDURES

- a) Connect the line cord to a 105 to 125 volt, 55 to 440 Hz source and set the AC switch to ON. The AC lamp should light.
- b) Rotate the CURRENT control fully clockwise. (The LIMIT lamp will light if there is a short circuit or overload at the output terminals.)
- c) Set the METER FUNCTION switch to V and adjust the VOLTAGE and FINE VOLTAGE controls until the panel meter indicates the desired output voltage.
- d) Connect the load to either the front or rear panel DC+ and DC- terminals.

2.3 CURRENT LIMITING

Rotate the CURRENT control fully counterclockwise. Then, adjust it clockwise until the LIMIT lamp just goes out. This will limit the load current approximately 10% above the nominal value.

2.4 SENSING

The points to which the sensing leads are connected are the points at which optimum regulation is obtained. When the output voltage is sensed at the output terminals, the voltage across the load will be:

$$V_1 = V_{\text{out}} - I_1 \times R_{1w}$$

where:

V_{out}	= supply output voltage
V_1	= voltage across the load
I_1	= load current
R_{1w}	= resistance of wires connecting power supply and load

The unit is connected for local sensing (i.e., the sensing terminals are connected to the output terminals) when it is shipped. However, for remote sensing, proceed as follows:

- a) Disconnect the links between the S+ and DC+ and S- and DC- terminals at the rear of the supply. Connect the S+ terminal to the positive side of the load. Connect the S- terminal to the negative side of the load.

- b) The wires between the sensing terminals and the load should be run as a tightly twisted, shielded pair. Connect the shield to chassis ground (G) terminal.

2.5 REMOTE VOLTAGE PROGRAMMING

This feature makes remote control of the output voltage of the supply possible. However, due to the type of regulator used in the supply, the programming range is limited by the power dissipation in the series pass transistors. The curve printed on the rear panel of the unit shows programmable ranges for three settings of the VOLTAGE control. For example, if the VOLTAGE control is set for 50 vdc output, the supply may be programmed from 44 VDC to 45 VDC with a 1.5 ampere load or from 35 VDC to 58 VDC with a 1 ampere load.

NOTE: The programming terminals are very sensitive to noise and hum pickup. A shielded, twisted pair of wires should be used to connect the programming resistance to the terminals. The shield must be connected to the chassis ground (G) terminal. Locate the resistance away from fields caused by solenoids, radio transmitters, etc.

- a) Adjust the VOLTAGE control until the panel meter indicates output voltage closest to that to which the supply will be programmed. Set the AC switch to OFF.
- b) Disconnect the link between the RV1 and RV2 terminals. Connect the programming resistance between the RV1 and S- terminals. The value of this resistance is given by:

$$R_p = V_o \times 150 \quad \text{where: } R_p = \begin{array}{l} \text{programming resistance} \\ \text{in ohms} \end{array}$$

$$V_o = \begin{array}{l} \text{desired output voltage} \\ \text{in volts} \end{array}$$

- c) Connect the load and set the AC switch to ON. The series pass transistors will be protected from excessive dissipation in any case of overload by the dissipation monitoring circuit.* The LIMIT lamp will light if this condition should occur.

* Patent applied for.

**SECTION 3
MAINTENANCE****3.1 GENERAL**

Under normal conditions, no special maintenance of the Model 5015T is required. Should servicing be necessary, read this section before repairing or calibrating.

3.2 TROUBLE SYMPTOMS AND SUGGESTED REMEDIES

- a) **General:** Measure the voltage at the circuit components as a first step when servicing the supply. The schematic diagram gives the operating potentials of all semiconductors and component locations.

CAUTION: WHEN UNSOLDERING SEMICONDUCTORS FOR TEST, USE A HEAT SINK TO PREVENT THERMAL DAMAGE. LONG NOSE PLIERS INSERTED BETWEEN THE SEMICONDUCTOR AND SOLDER JUNCTION IS ADEQUATE. NEVER OPERATE THE POWER SUPPLY WITH LEADS DISCONNECTED OR SEMICONDUCTORS REMOVED, AS OPERATING POTENTIALS IN THE AC AMPLIFIER MAY CHANGE RADICALLY WHEN A COMPONENT IS REMOVED OR DISCONNECTED.

- b) **Power Supply Does Not Go On:** If the AC lamp does not light, check the AC fuse. If the fuse blows repeatedly, check diodes CR1 through CR4 and CR13, transformers T1 through T3, capacitors C10, C11 and C13 and thermostat S2. Check the diodes by connecting an ohmmeter across the diode and taking a resistance reading. Reverse the meter leads and take another reading. If one reading is not at least 5 times greater than the other, the diode is defective. If one diode in any rectifier group is defective, replace all diodes in that group. A short circuit in one will produce high surge currents in the other which can result in junction damage.
- c) **No DC Output Voltage:** In this case the AC lamp lights but no output voltage is available. Be sure that the LIMIT lamp is out (the CURRENT control might be fully counterclockwise). If the LIMIT lamp is out, check DC fuse F2, resistor R1, capacitor C1 and resistor R35. If the LIMIT lamp lights and adjustment of the current control does not extinguish it, check safety diode CR10, capacitor C8 and transistors Q5 and Q9. Check for incorrect programming or sensing connections. Safety diode CR10 is connected across the output in the opposite polarity to the DC output voltage. If the reverse current flow is excessive, this diode may weld, placing a permanent short circuit across the supply output. Restore normal operation by replacing the diode (located on the front of the amplifier board).
- d) **Regulator Failure:** Make the adjustments in paragraph 3.3. If these adjustments do not correct the regulation, check the potentials on the amplifier transistors, voltage reference, etc. If any voltage is incorrect, disconnect the AC power and check for defective transistors. This check can be made

without removing the transistor from the circuit by using an ohmmeter set to its low resistance scale (R x 1) and measuring the forward/reverse resistance at the collector-base and base-emitter junctions. A resistance ratio of less than 5 to 1 shows that the transistor is defective. Remove it and check it on a transistor checker.

CAUTION: THIS TEST IS NOT RECOMMENDED FOR HIGH FREQUENCY OR LOW CURRENT DEVICES IN OTHER INSTRUMENTATION, AS CURRENTS FROM SOME OHMMETERS MAY DAMAGE SMALL SEMICONDUCTOR JUNCTIONS.

- e) **Poor Regulation, High Ripple:** Make a point-to-point voltage and resistance check. Check all capacitors for open circuits and all electrolytic capacitors for excessive leakage. Make stage gain measurements by changing the output load current and noting the change in base current of each amplifier stage. Use low resistance milliammeters and microammeters to avoid upsetting the regulator. The open loop current gain of the regulator should be more than 10^6 from the base current of the input differential amplifier to the collector current of the series regulator.

3.3 ADJUSTMENT AND CALIBRATION (Adjust and Calibrate in this order)

Test Equipment Required: Differential Voltmeter (DVM), Keithley 660A or equivalent
 Variable load resistor, 33 ohms, 100 watts
 DC ammeter, 0 to 3.0 amperes
 Multimeter, 20,000 ohms/VDC, Simpson Model 220 or equivalent

a) **Panel Meter Calibration:**

1. Remove front panel and chassis from carrying case.
2. Connect the variable load resistor (set to 33 ohms) in series with the DC ammeter. Connect this arrangement across the DC+ and DC- terminals at the rear terminal strip.
3. Set the supply for local sensing and programming.
4. Set the CURRENT control fully clockwise.
5. Turn on the power supply and allow for a 15 minute warm-up. Set the Meter function switch to V and adjust the VOLTAGE control for approximately 35 volts.
6. Adjust the variable load resistor for 1.5 amperes on the external DC ammeter.

7. Set the METER FUNCTION switch to A. Adjust potentiometer R32 for 1.5 amperes.
 8. Disconnect the test equipment.
- b) Voltage Range Adjustment:
1. Rotate the VOLTAGE control fully clockwise and the FINE VOLTAGE control fully counterclockwise.
 2. Connect the DVM across the S+ and S- terminals on the rear terminal strip.
 3. Adjust potentiometer R27 for a DVM reading of 50.00 volts.
- c) Regulation Adjustment:
1. While observing the DVM, alternately connect and disconnect the variable load resistor (set for 33 ohms) across the DC+ and DC- terminals on the rear terminal strip. If the output voltage varies more than 10 millivolts when the load is connected and disconnected, adjust potentiometer R16 until the voltage remains constant.
 2. Disconnect the test equipment.
- d) Dissipation Limit Adjustment:
1. Rotate the VOLTAGE control fully counterclockwise and the CURRENT control fully clockwise.
 2. Connect the DC ammeter across the DC+ and DC- terminals.
 3. Connect the multimeter (set to the 50 VDC range) between the collector and emitter of transistor Q1.
 4. Rotate the VOLTAGE CONTROL clockwise slowly until the DC ammeter reading exceeds 1.4 amperes. Continue adjusting the voltage control clockwise as the ammeter reading decreases and then increases exactly 1.4 amperes.
 5. The multimeter reading should be exactly 37 volts. If it is not, adjust potentiometer R12 (on the front of the amplifier board).
 6. Repeat steps 4 and 5 for simultaneous readings of 1.4 amperes and 37 volts.
 7. Disconnect the test equipment.

e) Current Limit Adjustment:

1. Rotate the VOLTAGE control fully clockwise and the CURRENT control fully clockwise.
2. Connect the variable load resistor (set to 20 ohms) in series with the DC ammeter across the DC+ and DC- terminals on the rear terminal strip.
3. Rotate the voltage control clockwise until the LIMIT lamp lights and note the current indicated on the DC ammeter. If the reading is not 1.8 ± 0.15 amperes, adjust potentiometer R22 (on the front of the amplifier board) until this reading appears.
4. Decrease the load resistance to 0 ohms. The DC ammeter reading should be less than 0.55 amperes.
5. Disconnect the test equipment.

A D D E N D A

POWER SUPPLY

MODEL 5015T

The Electrical Parts List and/or Schematic Diagram have been modified as follows:

<u>Circuit Number</u>	<u>Description</u>	<u>Mfr Code Number</u>	<u>Part Number</u>
I2	Pilot Light Assembly	98095	PLA-14
<u>Use With:</u>	Pot and Lamp Board	98095	PS5015T-40
	Pot and Lamp Board-Spacer	98095	PS5015T-41
	(2) AWG. 22 Teflon Wire (Black 4 inches)		

CHANGE:

C13	Capacitor, ceramic, disc, 1 μ f, 600 vdc	98095	CC-37-6
R17	Resistor, wirewound, 1.0 Ω , $\pm 5\%$, 7 w	98095	RW-010-3RA
R37	Resistor, wirewound, 700 Ω , $\pm 5\%$, 7 w	98095	RW-701-3RA

A P P E N D I X

1. INTRODUCTION

This Appendix contains an Electrical Parts List, Schematic Diagram, Parts Location Diagram and equipment Warranty.

2. ELECTRICAL PARTS LIST

All electrical and electronic parts are listed in the sequence of their circuit numbers as shown on the Schematic Diagram. A brief description of each part is given, followed by the code number of the manufacturer and his part number. All manufacturers' code numbers are taken from Cataloging Handbooks H4-1 and H4-2, Federal Supply Code for Manufacturers. These handbooks can be obtained from Federal Agencies or ordered directly from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

We recommend that all parts with the code number 98095 be ordered directly from Power Designs, Inc. The commercial equivalents of these parts may have wide parameter tolerances or require special factory inspection or modification before they can be used in the power supply.

All components used in the power supply or supplied as replacements are carefully inspected at the factory. Inspections are performed on a 100% basis or at AQL levels to Military Specification MIL-Q-9858 under which Power Designs, Inc. has been qualified.

All semiconductors are inspected on a 100% basis, not only for operating parameters, but also for critical characteristics related to reliability and predictable life expectancy. Some of these characteristics are observed when the device is taken beyond its normal operating regions. These test techniques have been developed under a "predictable reliability" program in operation at Power Designs, Inc. for the past twelve years. Under this program, quality control procedures are constantly reevaluated and updated as advances are made in solid state technology and experience is gained from field history.

Semiconductor manufacturers are continually modifying their products. Complete lines are discontinued to be replaced by devices having improved gain, operating voltage levels and frequency responses. The high gain, closed loop DC amplifiers used in regulator circuits are particularly sensitive to slight changes in these parameters. Commercial or military "equivalent" transistors may affect the performance of the power supply. We can assure compliance with the original specifications if replacement semiconductors are ordered from the Factory.

All replacement semiconductors are processed and stocked at the factory to insure complete interchangeability with the devices in the original equipment. These devices are coded with a Power Designs, Inc. part number. For example:

<u>MS</u>	<u>1028</u>	<u>A</u>
Semiconductor Manufacturer's Code	Power Designs, Inc. Type	Suffix Identifying Special Parameters

When ordering replacements, please identify the device as thoroughly as possible, giving the model and serial number if available.

The replacement part you receive may not have the same part number as that shown on the Electrical Parts List. This can be due to several factors:

- a. A different prefix indicates that Power Designs, Inc. is using another vendor source. The operating characteristics of the devices are identical.
- b. A completely different part number indicates:
 1. The original vendor has discontinued manufacture of the item or can no longer manufacture it to the original specifications.
 2. A better device for use in a particular circuit has been substituted.
 3. Tighter controls for interchangeability have provided greater assurance of reliability with the replacement.

ELECTRICAL PARTS LIST

NOTE: Before replacing semiconductors, see paragraph 2 of this Appendix.

Circuit Number	Description	Mfr Code Number	Part Number
C1	Capacitor, electrolytic, 2500 μ f, 100 vdc	98095	CE-252-101
C2	Capacitor, plastic film, .001 μ f, 200 vdc	98095	CP-24-2
C3 thru C5	Capacitor, plastic film, .01 μ f, 200 vdc	98095	CP-16-2
C6	Capacitor, electrolytic, 20 μ f, 100 vdc	98095	CE-103-1
C7, C8	Capacitor, electrolytic, 100 μ f, 80 vdc	98095	CE-91-.80
C9	Capacitor, plastic film, 0.22 μ f, 200 vdc	98095	CP-22-2
C10	Capacitor, electrolytic, 100 μ f, 80 vdc	98095	CE-91-.80
C11	Capacitor, plastic film, 0.1 μ f, 200 vdc	98095	CP-17-2
C12	Capacitor, electrolytic, 51 μ f, 25 vdc	98095	CEX-51-25
C13	Capacitor, ceramic disc, .05 μ f, 600 vdc	98095	CC-34-6
C14	Capacitor, ceramic disc, .01 μ f, 1 kvdc	98095	CC-13-10
CR1, CR2	Diode, silicon	98095	SI5A2R (red dot)
CR3 thru CR5	Diode, silicon	98095	GI44
CR6	Diode, silicon, zener	98095	SI250A
CR7 thru CR10	Diode, silicon	98095	GI44
CR11	Diode, silicon, zener	98095	TS825D, E, F
CR12	Diode, silicon, zener	98095	TS825J, K
CR13	Diode, silicon	98095	GI44
CR14	Diode, silicon, zener	98095	1N4881-2
CR15	Diode, silicon, zener	98095	D25A, B
F1	Fuse, 3 amperes, Slo-Blo	71400	MDX
F2	Fuse, 2.5 amperes, Slo-Blo	71400	MDL
I1	Pilot light assembly	98095	PLA-7
I2	Pilot light assembly	98095	PLA-18
M1	Meter, dual volt-ammeter, 0-50V/0-1.5A	98095	MVA-85
Q1	Transistor, silicon, NPN	98095	TRW1700C (red)
Q2	Transistor, silicon, NPN	98095	MS1700A
Q3	Transistor, silicon, PNP	98095	TI1028A
Q4	Transistor, silicon, NPN	98095	2N2243A
Q5, Q6	Transistor, silicon, NPN	98095	TI2270/U
Q7	Transistor, silicon, PNP	98095	TI1028A
Q8	Transistor, silicon, NPN	98095	TI2270/U
Q9	Transistor, silicon, PNP	98095	2N4888

5015T
ELECTRICAL PARTS LIST

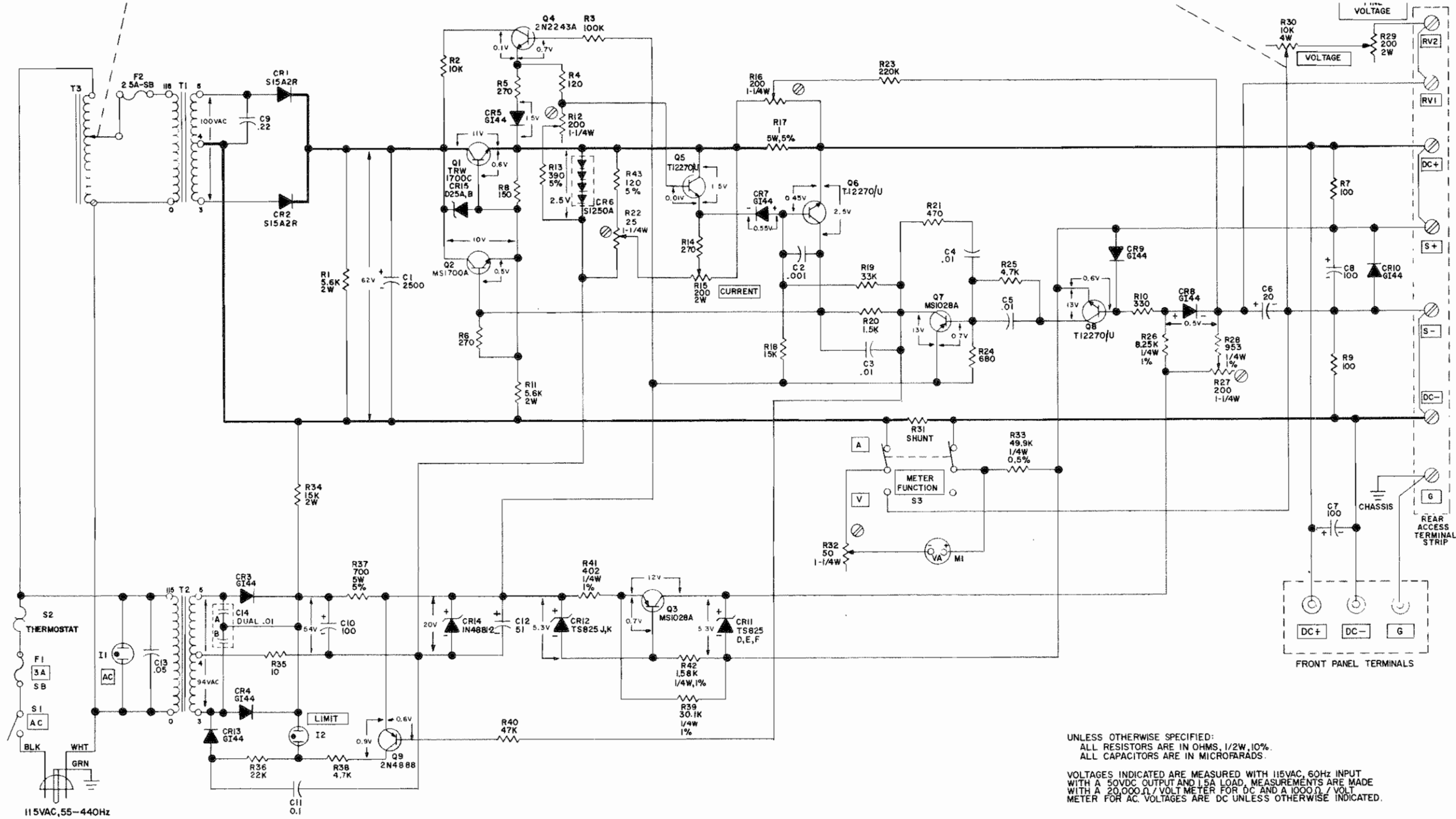
Circuit Number	Description	Mfr Code Number	Part Number
R1	Resistor, composition, 5.6 k Ω , \pm 10%, 2 w	01121	HB5621
R2	Resistor, composition, 10 k Ω , \pm 10%, 1/2 w	01121	EB1031
R3	Resistor, composition, 100 k Ω , \pm 10%, 1/2 w	01121	EB1041
R4	Resistor, composition, 120 Ω , \pm 10%, 1/2 w	01121	EB1211
R5, R6	Resistor, composition, 270 Ω , \pm 10%, 1/2 w	01121	EB2711
R7	Resistor, composition, 100 Ω , \pm 10%, 1/2 w	01121	EB1011
R8	Resistor, composition, 150 Ω , \pm 10%, 1/2 w	01121	EB1511
R9	Resistor, composition, 100 Ω , \pm 10%, 1/2 w	01121	EB1011
R10	Resistor, composition, 330 Ω , \pm 10%, 1/2 w	01121	EB3311
R11	Resistor, composition, 5.6 k Ω , \pm 10%, 2 w	01121	HB5621
R12	Resistor, variable, wirewound, 200 Ω , \pm 10%, 1-1/4 w	98095	RWT-201-C4
R13	Resistor, composition, 390 Ω , \pm 5%, 1/2 w	01121	EB3915
R14	Resistor, composition, 270 Ω , \pm 10%, 1/2 w	01121	EB2711
R15	Resistor, variable, wirewound, 200 Ω , \pm 10%, 2 w	98095	RWV-201C4-.87
R16	Resistor, variable, wirewound, 200 Ω , \pm 10%, 1-1/4 w	98095	RWT-201-C4
R17	Resistor, variable, wirewound, 1 Ω , \pm 5%, 5 w	98095	RW-010-3DA
R18	Resistor, composition, 15 k Ω , \pm 10%, 1/2 w	01121	EB1531
R19	Resistor, composition, 33 k Ω , \pm 10%, 1/2 w	01121	EB3331
R20	Resistor, composition, 1.5 k Ω , \pm 10%, 1/2 w	01121	EB1521
R21	Resistor, composition, 470 Ω , \pm 10%, 1/2 w	01121	EB4711
R22	Resistor, variable, wirewound, 25 Ω , \pm 10%, 1-1/4 w	98095	RWT-250-C4
R23	Resistor, composition, 220 k Ω , \pm 10%, 1/2 w	01121	EB2241
R24	Resistor, composition, 680 Ω , \pm 10%, 1/2 w	01121	EB6811
R25	Resistor, composition, 4.7 k Ω , \pm 10%, 1/2 w	01121	EB4721
R26	Resistor, precision, metal film, 8.25 k Ω , \pm 1%, 1/4 w	98095	RD-8251-1QA
R27	Resistor, variable, wirewound, 200 Ω , \pm 10%, 1-1/4 w	98095	RWT-201-C4
R28	Resistor, precision, metal film, 953 Ω , \pm 1%, 1/4 w	98095	RD-9530-1QA
R29	Resistor, variable, wirewound, 200 Ω , \pm 10%, 2 w	98095	RWV-201C4-.87
R30	Resistor, variable, wirewound, 10 k Ω , \pm 10%, 4 w (part of T3)	98095	RWV103M4-3.62
R31	Resistor, wirewound, meter shunt, .067 Ω , \pm 10%	98095	RWF00067
R32	Resistor, variable, wirewound, 50 Ω , \pm 10%, 1-1/4 w	98095	RWT-500-C4
R33	Resistor, precision, metal film, 49.9 k Ω , \pm 0.5%, 1/4 w	98095	RD-49.92-6Q
R34	Resistor, composition, 15 k Ω , \pm 10%, 2 w	01121	HB1531
R35	Resistor, composition, 10 Ω , \pm 10%, 1/2 w	01121	EB1001
R36	Resistor, composition, 22 k Ω , \pm 10%, 1/2 w	01121	EB2231
R37	Resistor, wirewound, 700 Ω , \pm 5%, 5 w	98095	RW-701-3DA
R38	Resistor, composition, 4.7 k Ω , \pm 10%, 1/2 w	01121	EB4721
R39	Resistor, precision, metal film, 30.1 k Ω , \pm 1%, 1/4 w	98095	RD-3012-1QA
R40	Resistor, composition, 47 k Ω , \pm 10%, 1/2 w	01121	EB4731
R41	Resistor, precision, metal film, 402 Ω , \pm 1%, 1/4 w	98095	RD-4020-1QA
R42	Resistor, precision, metal film, 1.58 k Ω , \pm 1%, 1/4 w	98095	RD-1581-1QA
R43	Resistor, composition, 120 Ω , \pm 5%, 1/2 w	01121	EB1215

5015T
ELECTRICAL PARTS LIST

Circuit Number	Description	Mfr Code Number	Part Number
S1	Switch, toggle, SPST	98095	ST-5
S2	Thermostat	98095	STH-2
S3	Switch, toggle, DPDT	98095	ST-16
T1	Transformer, main	98095	TTM-5015T-1A
T2	Transformer, auxiliary	98095	TTH-27
T3	Transformer, auto variable assembly (part of R30)	98095	TTV-1.5E-1

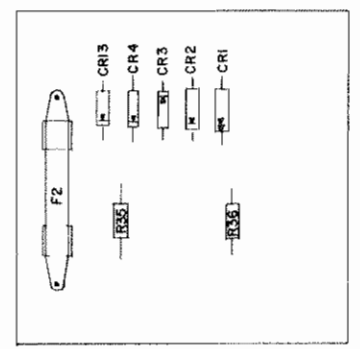
CODE LIST OF MANUFACTURERS

01121	Allen-Bradley Company	Milwaukee, Wisconsin
71400	Bussman Manufacturing Division	St. Louis, Missouri
98095	Power Designs, Inc.	Westbury, New York

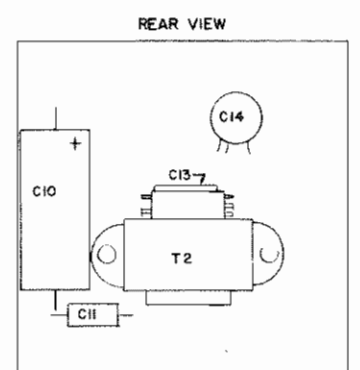


UNLESS OTHERWISE SPECIFIED:
 ALL RESISTORS ARE IN OHMS, 1/2W, 10%.
 ALL CAPACITORS ARE IN MICROFARADS.

VOLTAGES INDICATED ARE MEASURED WITH 115VAC, 60Hz INPUT
 WITH A 50VDC OUTPUT AND 1.5A LOAD. MEASUREMENTS ARE MADE
 WITH A 20,000Ω/VOLT METER FOR DC AND A 1000Ω/VOLT
 METER FOR AC. VOLTAGES ARE DC UNLESS OTHERWISE INDICATED.

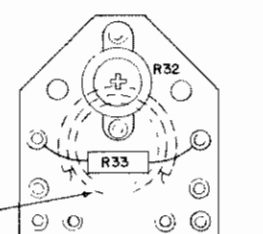


FRONT VIEW

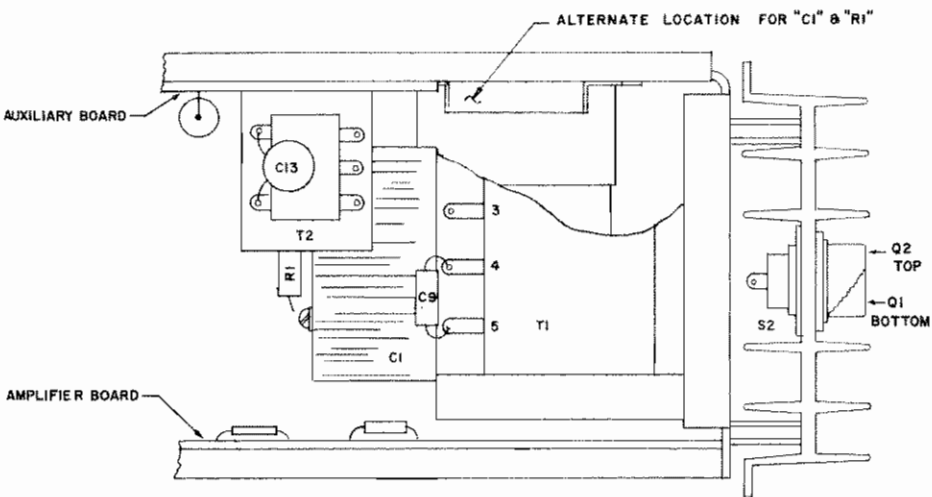


REAR VIEW

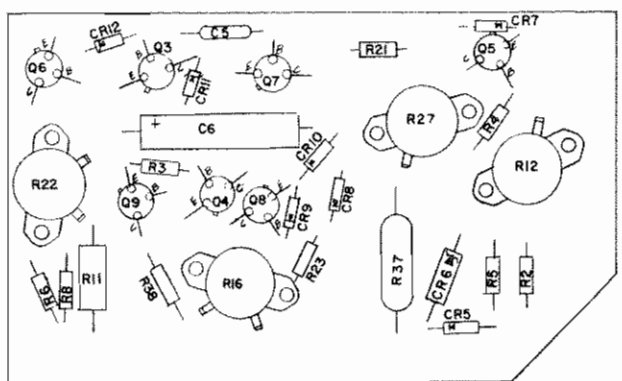
AUXILIARY BOARD ASSY.
 LOCATION OF COMPONENTS



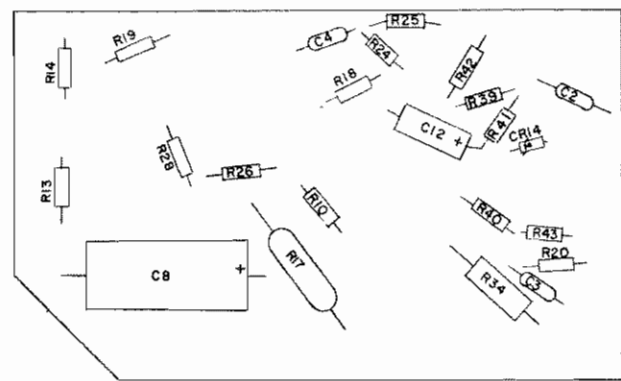
METER BOARD
 LOCATION OF COMPONENTS



PARTIAL TOP VIEW OF CHASSIS—LOCATION OF COMPONENTS



FRONT VIEW



REAR VIEW

LOCATION OF COMPONENTS ON AMPLIFIER BOARD

NOTICE
 PATENTS HAVE BEEN GRANTED, PATENT APPLICATIONS
 ARE PENDING OR IN PROCESS OF PREPARATION ON THE
 PROPRIETARY PORTIONS OF THE CIRCUITS SHOWN ON
 THIS DRAWING. REPRODUCTION IN WHOLE OR IN PART
 MAY NOT BE MADE WITHOUT PERMISSION.

G	REVISED, ECN 2401, 2402	
F	REVISED, ECN 2398	
E	REVISED, ECN 1997	
D	REVISED, ECN 1532	
C	REVISED, ECN 1485, 1486	
B	REVISED, ECN 1446	
A	RELEASED	
DRAWING NO. PS-5015T-19		REV. G
TITLE SCHEMATIC, MOD. 5015T PWR SUP, 0-50 VDC, 0-1.5A		
DRAWN C. G.	CHECKED	APPROVED
DATE	DATE	DATE
Power Designs Inc. NEW YORK		

WARRANTY

POWER DESIGNS INC., warrants to the original purchaser, each instrument sold by us, or our authorized agents, and all the parts thereof, to be free from defects in material or workmanship under normal use and service within the specified ratings and operating conditions.

Its obligation under this warranty is hereby limited to the repair or replacement of any instrument, or part thereof, which is returned to us within one year after delivery, and which shall prove, after our examination, to be thus defective.

This warranty does not include the cost of transportation charges to and from the factory and/or the cost of packaging or crating of instruments for return to the factory, unless such instrument is returned within thirty (30) days from the date of original shipment as shown on the packing list or shipping documents, and prior written authorization for such costs is obtained from the factory.

The repair or replacement of an instrument, or any part thereof, does not void or extend the original warranty.

POWER DESIGNS INC., reserves the right to discontinue any instrument without notice, or to make modifications in design at any time, without incurring any obligation to make these modifications in instruments previously sold.

POWER DESIGNS INC.

Westbury, L. I., New York

POWER DESIGNS PACIFIC, INC.

Palo Alto, California