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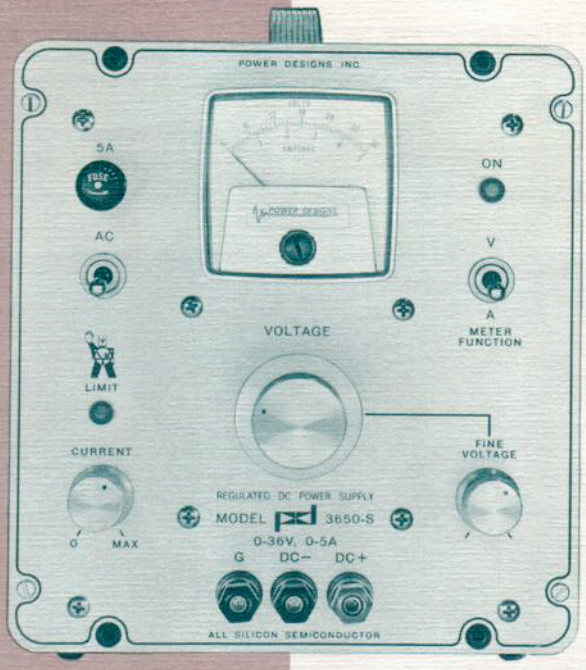
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POWER DESIGNS

CONSTANT-VOLTAGE DC POWER SOURCE

TECHNICAL DATA

MODEL 3650S



TUCKER ELECTRONICS
MASTER FILE
DO NOT SHIP

0–36 VOLTS
0–5 AMPERES

The Model 3650S 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. One or two supplies may be mounted in a standard 8¾″ 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.

SERIAL NO. 901065

ELECTRICAL SPECIFICATIONS

OUTPUT
0–36 VDC, continuously adjustable, 0–5 AMPS.

REGULATION
Better than 0.01% plus 3 MV for line-voltage variations of ±10% or 100% changes in rated load.

RIPPLE AND NOISE
Less than 500 μV rms at 60-Hz line; less than 1 MV rms at 400-Hz line.

TEMPERATURE COEFFICIENT
0.02% plus 2 MV per °C.

STABILITY
Better than 0.01% plus 5 MV 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 50 microseconds to return 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.

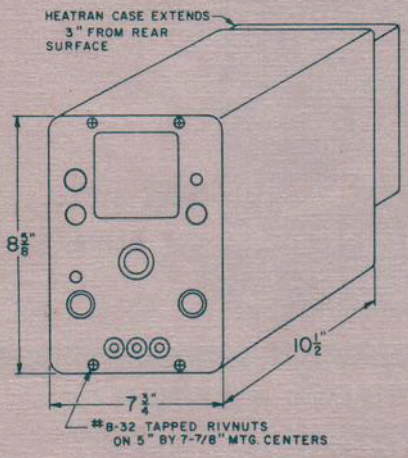
FRONT-PANEL OUTPUT TERMINALS
Three insulated binding posts are provided for positive output, negative output, and chassis ground. Either output terminal may be grounded or the output may be left floating.

REAR-PANEL OUTPUT TERMINALS
Screw terminals are provided on a phenolic barrier block for positive output, negative output, remote voltage programming, and positive and negative sensing.

INPUT POWER
105–125 V, 55–440 Hz, 1 phase, 300 W*.

*at nominal line voltage

DIMENSIONS





MECHANICAL SPECIFICATIONS

DIMENSIONS
7¾″ x 8⅝″ x 13½″ deep behind front panel.

WEIGHT
33 pounds.

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

PRICE **$299.00**
FOB Westbury, N. Y.

POWER DESIGNS, INC.
1700 SHAMES DRIVE • WESTBURY, L.I., NEW YORK • 516 ED 3-6200 TWX: 510-222-6561

POWER DESIGNS PACIFIC, INC.
3381 JUNIPERO SERRA • PALO ALTO, CALIFORNIA • 415-321-6111 TWX: 910-373-1251

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SECTION 1
GENERAL DESCRIPTION

1-1. DESCRIPTION

The Model 3650S is a regulated DC power source suitable for use with laboratory and industrial instrumentation. The equipment supplies from 0 to 36 volts at 5 amperes and automatically limits the load current if an overload should occur. The current limiting point is adjusted by a front panel control. Silicon semiconductors are used throughout for optimum temperature stability and reliability.

The unit is very 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 Model 3650S is designed for bench use. Panel adapters are available for mounting one or two units in a 19 inch rack.

1-2. ELECTRICAL SPECIFICATIONS

Table 1 lists the electrical specifications of the Model 3650S.

1-3. MECHANICAL SPECIFICATIONS

The Model 3650S is housed in a portable steel cabinet finished in blue vinyl enamel. The front panel is brushed, anodized aluminum with etched black lettering. The dimensions and weight are as follows:

Width: 7-3/4 inches
Height: 8-5/8 inches
Depth: 13-1/2 inches behind front panel

Weight: 33 pounds

*Patent applied for

TABLE 1. ELECTRICAL SPECIFICATIONS

Parameter	Value
Output	0 to 36 volts DC, 0 to 5 amperes, continuously adjustable.
Input	105 to 125 volts, 55 to 440 Hz, single phase, 300 watts (at nominal line voltage).
Regulation	Better than 0.01% +3 MV for line voltage variations of ±10% changes in rated load.
Ripple and Noise	Less than 500 microvolts rms at 60 Hz line; less than 1 millivolt at 400 Hz line.
Recovery Time	Less than 50 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%.
Stability	Better than 0.01% +5 millivolts per 8 hour period after warm-up at constant line, load and ambient temperature.
Temperature Coefficient	0.02% +2 millivolts per ^{o}C
Programming Constant	200 ohms per volt nominal
Source Impedance	Less than 0.003 ohm at DC, 0.15 ohm at 100 KHz, 1.5 ohms at 1 MHz.
Current Limiting	0 to 5 amperes, continuously adjustable
Operating Temperature Range	0 to 60^{o}C
Output Polarity	Either output terminal may be connected to ground. The maximum potential between any terminal and ground must not exceed 500 volts.

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. INSTALLATION

a. Connect the line cord to a 105 to 125 volt, 55 to 440 Hz source.

b. Rotate the CURRENT control fully clockwise.

c. Set the METER FUNCTION switch to V and adjust the VOLTAGE and FINE VOLTAGE controls for the desired output voltage as shown on the panel meter.

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. Readjust the CURRENT control clockwise until the LIMIT lamp just goes out.

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:

$$V_l = V_{out} - I_l \times R_{lw}$$

where V_{out} = supply output voltage
V_l = voltage across the load
I_l = load current
R_{lw} = resistance of wires connecting the 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, if remote sensing is desired:

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 tightly twisted together. If more than 6 feet of wire is used, a 20 uf, 65 vdc capacitor should be connected across the sensing terminals.

2-5. REMOTE VOLTAGE PROGRAMMING

This feature allows the output voltage of the supply to be controlled remotely. However, because of the type of regulator used, the programming range is limited by the power dissipation in the series

pass transistors. The curve printed on the rear panel shows programmable ranges for the three settings of the VOLTAGE control. For example, if the VOLTAGE control is set for 36 vdc output, the supply may be programmed from 31 vdc to 38 vdc with a 5 ampere load, or from 15 vdc to 43 vdc with a 2.5 ampere load. The dissipation monitor will automatically limit the series pass dissipation if the unit is operated outside the safe area. The LIMIT light will go on when the monitor operates.

NOTE

The programming terminals are sensitive to noise and hum pick-up. A shielded, twisted pair of wires should be used to connect the programming resistor to the terminals. The shield must be connected to the chassis of the unit. Locate the resistor away from fields caused by solenoids, radio transmitters, etc.

a. Adjust the VOLTAGE control until the panel meter indicates the output voltage closest to that at which the supply will be programmed. Set the AC switch to OFF.

b. Disconnect the jumper between the RV1 and RV2 terminals. Connect the programming resistance between the RV1 and S- terminals. The value of this resistance is given by:

$$R_p = V_o \times 200$$

where R_p = the programming resistance in ohms
V_o = the desired output voltage change in volts

c. Connect the load and set the AC switch to ON. The series pass transistors will be protected from excessive dissipation by the dissipation monitoring circuit. The LIMIT lamp will light if an overload should occur.

CAUTION

DO NOT MAKE CHANGES IN THE PROGRAMMING CONNECTIONS WITH LINE VOLTAGE APPLIED TO THE UNIT.

SECTION 3
PRINCIPLES OF OPERATION

3-1. GENERAL

The Model 3650S uses a conventional series regulator to control the output from a variable voltage full-wave rectifier. Series pass transistors Q1 through Q4 act as the control elements. The voltage drop across these transistors is adjusted by a high gain, DC amplifier in order to maintain the output voltage at some preset level. The dissipation limiting circuit continuously monitors the series pass power dissipation and limits it if an overload should occur. Operating voltages from the DC amplifier and power monitoring circuits are derived from an auxiliary regulator.

3-2. UNREGULATED SOURCE

The output from transformers T3 and T1 is rectified by diodes CR1 and CR2 and smoothed by capacitor C3.

3-3. SERIES PASS ELEMENT

Series pass transistors Q1 through Q4 are connected in parallel. Base drive is provided by Q5 connected as a Darlington amplifier.

3-4. CONTROL AMPLIFIER

Transistor Q10 compares the DC output voltage with the voltage across reference zener CR14. An increase in the output voltage will cause Q10 collector current to fall, reducing the collector current of Q9. This in turn will reduce the collector currents of Q5 and the series pass network and the output voltage will fall. Compensation for load current changes is provided by R18 and R27. CR6 compensates for temperature effects.

3-5. DISSIPATION MONITOR

Q7 monitors the voltage across the series pass transistors. Q8 monitors the voltage across load current sensing resistor R19. Should either of these voltages rise above the level set by the appropriate potentiometer, R14 or R24 and R16, Q7 and Q8 will start to conduct, preventing the load current from rising further.

3-6. AUXILIARY REGULATOR

Zener diode CR12 provides regulated 20 vdc for the semiconductors in the control amplifier and dissipation monitor. Zener diode CR14 provides the reference voltage for the control amplifier and any change in the reference will be reflected in the output voltage. To minimize these changes, Q11 and CR13 maintain a constant current through CR14 and are compensated against line voltage and temperature changes.

3-7. LIMIT INDICATOR

When the unit is in the current or dissipation limiting mode, Q10 will be in saturation and Q12 will be cut off as a result. This will allow lamp I2 to light. As soon as Q10 comes out of saturation, Q12 will start to conduct and the lamp will no longer have sufficient voltage

SECTION 4
MAINTENANCE

4-1. MAINTENANCE

Under normal conditions, no special maintenance of the Model 3650S is required. However, the characteristics of semiconductor components do change with age and the following adjustments and calibration should be made at six-monthly intervals:

4-2. MAXIMUM VOLTAGE ADJUSTMENT

a. Rotate the VOLTAGE and CURRENT controls fully clockwise. Rotate the FINE VOLTAGE control fully counterclockwise.

b. Connect the line cord to a 115 VAC supply. Set the AC switch to ON. Set the METER FUNCTION switch to V.

c. Adjust trimmer potentiometer R30 until the panel voltmeter reads 36 volts.

4-3. LOAD REGULATION

a. Repeat steps a and b in paragraph 4-2.

b. Connect a differential or digital voltmeter between the S+ and S- terminals.

c. Connect the line cord to a 115 VAC supply and set the AC switch to ON. Note the voltmeter reading.

d. Connect a 7.2 ohm, 200 watt load between the rear panel DC+ and DC- terminals. Adjust potentiometer R18 until the voltmeter reading is the same as that noted in step c.

4-4. METER CALIBRATION

a. Energize the power supply. Set the METER FUNCTION switch to A.

b. Connect a 0 to 10 ampere ammeter in series with a 7.2 ohm, 200 watt load between the DC+ and DC- terminals.

c. Adjust the VOLTAGE and CURRENT controls until the ammeter indicates 5 amperes.

d. Adjust potentiometer R34 until panel meter indicates 5 amperes.

4-5. DISSIPATION LIMITER ADJUSTMENT

a. Energize the power supply. Set the METER FUNCTION switch to A. Rotate the CURRENT control fully clockwise.

b. Connect a 0-50 VDC meter between the collector and emitter of Q1. Short circuit the DC+ and DC- terminals.

c. Adjust the VOLTAGE control until the panel meter reads 1.5 amperes.

d. Adjust R14 until the voltmeter reads 50 volts.

e. Repeat steps c and d until no further adjustments are necessary.

4-6. CURRENT LIMITER ADJUSTMENT

a. Energize the power supply. Rotate the VOLTAGE AND CURRENT controls fully clockwise.

b. Connect a 0 to 10 ampere meter in series with a 6 ohm, 250 watt load between the DC+ and DC- terminals.

c. Adjust R24 until the ammeter indicates 5.5 amperes.

APPENDIX

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 are available through Federal Agencies. They may also be ordered directly from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

We recommend that all parts having the code number 98095 be ordered directly from Power Designs Inc. The commercial equivalents of these parts have either wide parameter tolerances or require special factory inspection or modification before they are suitable for use 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 in accordance with Military Specification MIL-Q-9858 under which Power Designs Inc. has been qualified.

All semiconductors are inspected on a 100% basis. They are inspected 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 ten years. Under this program, quality-control procedures are constantly revaluated and updated as new advances are made in solid-state technology and additional experience is gleaned from field history.

Semiconductor manufacturers are constantly modifying their products. Complete lines are frequently discontinued to be replaced by devices having improved gain, operating voltage levels, and frequency response. 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 used as replacements may affect the power supply performance. Compliance with the original specifications can be assured 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. To insure that proper replacements are provided, the original devices are coded with a Power Designs Inc. part number as follows:

MS	1028	A
Semiconductor Manufacturer's Code	Power Designs Inc. Type	Suffix Identifying Special Parameters

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

In some cases the replacement part received may have a different part number from that given in the Electrical Parts List. This can be due to several factors:

a. A different prefix indicates that Power Designs Inc. is using a different vendor source. The operating characteristics of the devices are identical.

b. A completely different part number indicates:

1. The original vendor discontinued manufacture of the item or could no longer manufacture it to the original specifications.

2. A better device for use in the particular circuit has been substituted.

3. Tighter controls for interchangeability have provided greater assurance of improved reliability with the new replacement.

ELECTRICAL PARTS LIST

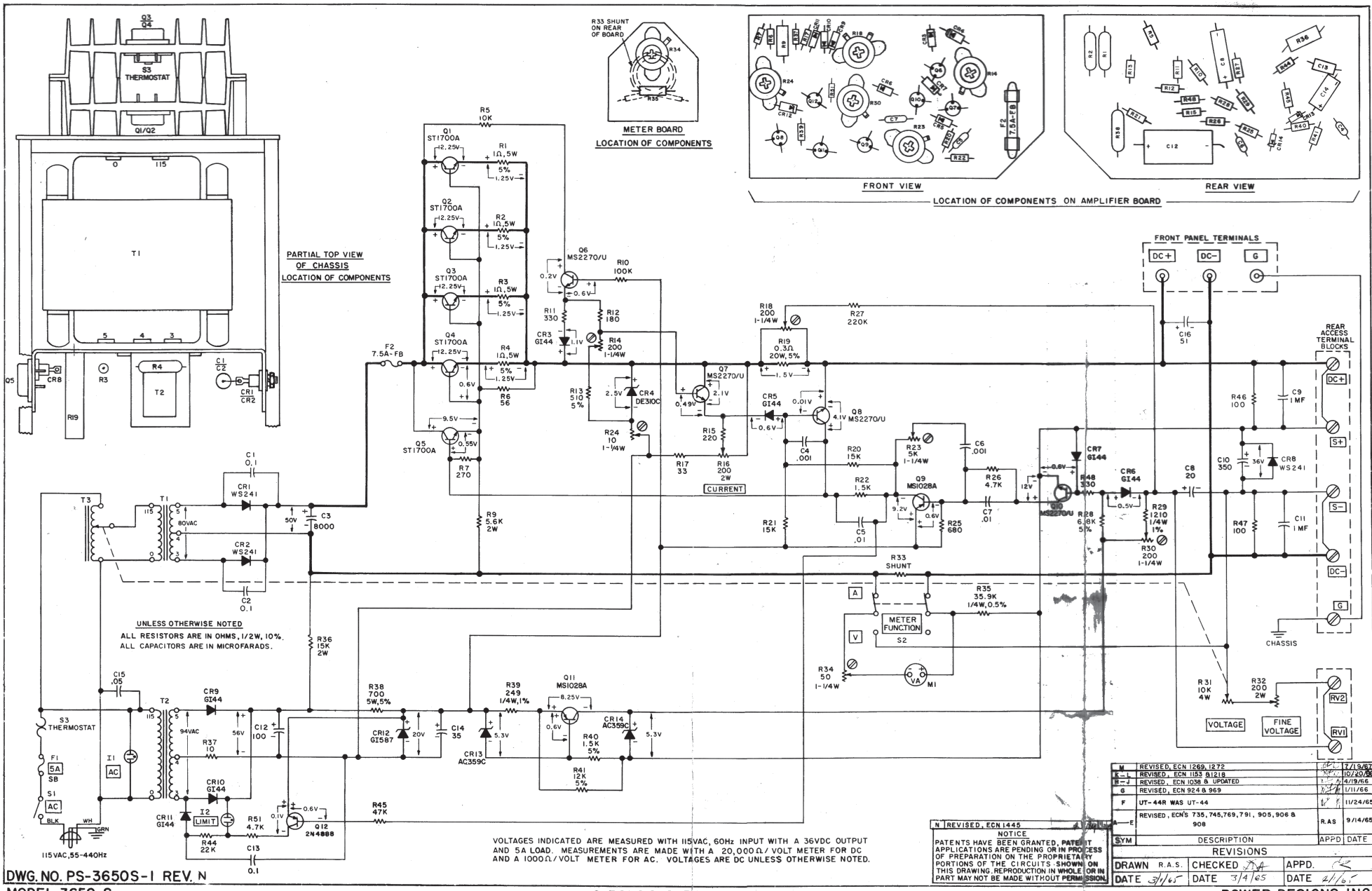
NOTE: When replacing semiconductors, note the information in paragraph 2 of this section.

Circuit Number	Description	Mfr Code Number	Part Number
C1,C2	Capacitor,plastic film,0.1 uf,200 vdc	98095	CP-17-2
C3	Capacitor,electrolytic,8000 uf,60 vdc	98095	CE-76-.6
C4	Capacitor,plastic film,0.001 uf,200 vdc	98095	CP-24-2
C5	Capacitor,plastic film,0.01 uf,200 vdc	98095	CP-16-2
C6	Capacitor,plastic film,0.001 uf,200 vdc	98095	CP-24-2
C7	Capacitor,plastic film,0.01 uf,200 vdc	98095	CP-16-2
C8	Capacitor,electrolytic,20 uf,100 vdc	98095	CE-103-1
C9	Capacitor,ceramic disc,1 uf,3 vdc	98095	CC-100M3AD
C10	Capacitor,electrolytic,350 uf,85 vdc	98095	CE-47-.85LT
C11	Capacitor,ceramic disc,1 uf,3 vdc	98095	CC-100M3AD
C12	Capacitor,electrolytic,100 uf,80 vdc	98095	CE-91-.8
C13	Capacitor,plastic film,0.1 uf,200 vdc	98095	CP-17-2
C14	Capacitor,electrolytic,35 uf,25 vdc	98095	CE-16-.25
C15	Capacitor,ceramic disc,0.05 uf,600 vdc	98095	CC-34-6
C16	Capacitor,electrolytic,51 uf,50 vdc	98095	CEX-51-50
CR1,CR2	Diode, silicon	98095	ST241
CR3	Diode, silicon	98095	GI44
CR4	Diode, silicon, zener	98095	DE3100
CR5 thru CR7	Diode, silicon	98095	GI44
CR8	Diode, silicon	98095	ST241
CR9 thru CR11	Diode, silicon	98095	GI44
CR12	Diode, silicon, zener	98095	GI587
CR13,CR14	Diode, silicon, zener	98095	AC359C,D
F1	Fuse, "Slo-Blo," 5 amperes	71400	MDX5
F2	Fuse, "Fast-Blo," 7½ amperes	71400	AGC7½
I1	Lamp assembly, neon	98095	PLA-7
I2	Lamp assembly, neon	98095	PLA-8A
M1	Meter, dual scale, 0-36 V/0-5 amperes	98095	MVA-100
Q1 thru Q5	Transistor, silicon, NPN	98095	ST1700A
Q6 thru Q8	Transistor, silicon, NPN	98095	MS2270/U
Q9	Transistor, silicon, PNP	98095	MS1028A
Q10	Transistor, silicon, NPN	98095	MS2270/U
Q11	Transistor, silicon, PNP	98095	MS1028A
Q12	Transistor, silicon, PNP	98095	2N4888
R1 thru R4	Resistor,wirewound,1 ohm,5%,5 w	98095	RW-010-3RA
R5	Resistor,composition,10 k ohms,10%,½ w	01121	EB1031
R6	Resistor,composition,56 ohms,10%,½ w	01121	EB5601
R7	Resistor,composition,270 ohms,10%,½ w	01121	EB2711
R9	Resistor,composition,5.6 k ohms,10%,2 w	01121	HB5621
R10	Resistor,composition,100 k ohms,10%,½ w	01121	EB1041
R11	Resistor,composition,330 ohms,10%,½ w	01121	EB3311
R12	Resistor,composition,180 ohms,10%,½ w	01121	EB1811
R13	Resistor,composition,510 ohms,5%,½ w	01121	EB5115

Circuit Number	Description	Mfr Code Number	Part Number
R14	Resistor, variable, wirewound, 200 ohms, 10%, 1¼ w	98095	RWT-201-C4
R15	Resistor, composition, 220 ohms, 10%, ½ w	01121	EB2211
R16	Resistor, variable, wirewound, 200 ohms, 10%, 2 w	98095	RWV201C4.87
R17	Resistor, composition, 33 ohms, 10%, ½ w	01121	EB3301
R18	Resistor, variable, wirewound, 200 ohms, 10%, 1¼ w	98095	RWT-201-C4
R19	Resistor, wirewound, 0.3 ohms, 5%, 20 w	98095	RW-001-3F
R20, R21	Resistor, composition, 15 k ohms, 10%, ½ w	01121	EB1531
R22	Resistor, composition, 1.5 k ohms, 10%, ½ w	01121	EB1521
R23	Resistor, variable, wirewound, 5 k ohms, 10%, 1¼ w	98095	RWT-502-C4
R24	Resistor, variable, wirewound, 10 ohms, 10%, 1¼ w	98095	RWT-100-C4
R25	Resistor, composition, 680 ohms, 10%, ½ w	01121	EB6811
R26	Resistor, composition, 4.7 k ohms, 10%, ½ w	01121	EB4721
R27	Resistor, composition, 220 k ohms, 10%, ½ w	01121	EB2241
R28	Resistor, composition, 6.8 k ohms, 5%, ½ w	01121	EB6825
R29	Resistor, precision, metal film, 1210 ohms, 1%, ¼ w	98095	RD-1211-1QA
R30	Resistor, variable, wirewound, 200 ohms, 10%, 1¼ w	98095	RWT-201-C4
R31	Resistor, variable, wirewound, 10 k ohms, 10%, 4 w	98095	RWV103M4-5.06
R32	Resistor, variable, wirewound, 200 ohms, 10%, 2 w	98095	RWV201C4.87
R33	Resistor, wirewound, 0.2 ohms, 10%	98095	RWF00020
R34	Resistor, variable, wirewound, 50 ohms, 10%, 1¼ w	98095	RWT-500-C4
R35	Resistor, precision, metal film, 35.9 k ohms, 0.5%, ¼w	98095	RD-3592-6QA
R36	Resistor, composition, 15 k ohms, 10%, 2 w	01121	HB1531
R37	Resistor, composition, 10 ohms, 10%, ½ w	01121	EB1001
R38	Resistor, wirewound, 700 ohms, 5%, 5 w	98095	RW-701-3RA
R39	Resistor, precision, metal film, 249 ohms, 1%, ¼ w	98095	RD-2490-1QA
R40	Resistor, composition, 1.5 k ohms, 5%, ½ w	01121	EB1525
R41	Resistor, composition, 12 k ohms, 5%, ½ w	01121	EB1235
R44	Resistor, composition, 22 k ohms, 10%, ½ w	01121	EB2231
R45	Resistor, composition, 47 k ohms, 10%, ½ w	01121	EB4731
R46, R47	Resistor, composition, 100 ohms, 10%, ½ w	01121	EB1011
R48	Resistor, composition, 330 ohms, 10%, ½ w	01121	EB3311
R51	Resistor, composition, 4.7 k ohms, 10%, ½ w	01121	EB4721
S1	Switch, toggle, SPST	98095	ST-5
S2	Switch, toggle, DPDT	98095	ST-16
S3	Switch, thermal	98095	STH-2
T1	Transformer, power	98095	TTM-66
T2	Transformer, auxiliary	98095	TTH-27
T3	Transformer, variable	98095	TTV-3

CODE LIST OF MANUFACTURERS

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



SYM	DESCRIPTION	APPD	DATE
	REVISIONS		
M	REVISED, ECN 1269, 1272		7/19/67
K-L	REVISED, ECN 1153 &1218		10/20/66
H-J	REVISED, ECN 1038 & UPDATED		4/19/66
G	REVISED, ECN 924 & 969		1/11/66
F	UT-44R WAS UT-44		11/24/65
A-E	REVISED, ECN'S 735, 745, 769, 791, 905, 906 & 908	R.A.S	9/14/65
N	REVISED, ECN 1445		

DRAWN R.A.S. | CHECKED | APPD. | DATE 3/1/65 | DATE 3/1/65 | DATE 2/1/65

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DWG. NO. PS-3650S-1 REV. N

MODEL 3650-S
TRANSISTORIZED POWER SUPPLY

0-36VDC, 0-5A

POWER DESIGNS INC.
NEW YORK

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	316½ South Bumby , Orlando, Fla. 32803	(305) 241-2128
	430 W. Friendly Street, Greensboro, N. C. 27401	(919) 272-0855

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HYTRONIC MEASUREMENTS INC.	4940 E. 39 Avenue, Denver, Colorado 80207	(303) 388-4081
	1017 North 3rd Street, Suite 9, Phoenix, Arizona 85004	(602) 253-6104
	2022 South Main Street, Salt Lake City, Utah 84115	(801) 466-4924
	205 San Pablo South East, Albuquerque, New Mexico 87108	(505) 268-3941

NEW YORK (S.), CONNECTICUT (FAIRFIELD COUNTY)

QED ELECTRONICS	500 Nuber Avenue, Mount Vernon, N.Y. 10550	(914) 968-2200

NEW JERSEY, PENNSYLVANIA (E.)

QED ELECTRONICS	2916 Federal Street, Camden, New Jersey 08105	(215) 925-8711

MARYLAND, DELAWARE, WASHINGTON, D.C., VIRGINIA

QED ELECTRONICS	880 Bonifant Street, Silver Springs, Md. 20910	(301) 588-8134

NEW YORK (N.)

OSSMANN INSTRUMENTS, INC.	101 Pickard Drive, Syracuse, New York 13211	(315) 454-2461
	3100 Monroe Avenue, Rochester, New York 14618	(716) 586-0380
	Vestal Parkway East, Vestal, New York 13850	(607) 785-9947
	P.O. Box 207, Wappingers Falls, New York 12590	(914) 297-7777

NEW ENGLAND

HOWARD J. SCHUFT CO., INC.	815 Washington Street, Newtonville, Mass. 02160	(617) 527-5304 & 5

CONNECTICUT

HOWARD J. SCHUFT CO., INC.	965 Dixwell Avenue, New Haven, Connecticut 06514	(203) UN 5-1365

WASHINGTON, OREGON, IDAHO, MONTANA, ALASKA, BRITISH COLUMBIA

SHOWALTER-JUDD INC.	1806 S. Bush Place, Seattle, Washington 98144	(206) 324-7911

OHIO, PENNSYLVANIA (W.), MICHIGAN, INDIANA, KENTUCKY

HARVEY TEPLITZ & CO.	3718 Salem Avenue, Dayton, Ohio 45406	(513) 277-9178
	26847 Grand River Ave., Detroit, Michigan 48240	(313) 537-9058
	3945 Meadowbrook Blvd., Cleveland, Ohio 44118	(216) 371-2044

CANADA

R-O-R ASSOCIATES, LTD.	1470 Don Mills Road, Don Mills, Ontario	(416) 444-4403
	3825 Cavendish Blvd., Montreal 28, Quebec	(514) 482-8430
	1320 Carling Ave., Ottawa 3, Ontario	(613) 722-6531
	805 5th Street S.W., Calgary, Alberta	(403) 265-6470

FOREIGN

ROCKE INTERNATIONAL CORP.	13 East 40 Street, New York, New York 10016	(212) MU 9-0200

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.

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Westbury, L. I., New York

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