INSTRUCTION MANUAL

MODEL 4050 **SERIAL** ______________

POWER DESIGNS INC.
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ADDENDA

POWER SUPPLY

MODEL 4050

The Electrical Parts List has been modified as follows:

Circuit Number	Description	Mfr Code Number	Part Number
C14, C16	Capacitor, tantalum, 1 μf, 50 vdc	98095	CE-1-500

SECTION 1
GENERAL DESCRIPTION

1.1 DESCRIPTION

The Model 4050 is a low noise regulated DC source suitable for use with laboratory and industrial instrumentation. The unit supplies from 0 to 40 volts at 5 amperes and is provided with automatic overcurrent and overvoltage protection. The current limiting point and overvoltage crowbar trip point are adjustable by front panel controls.

Rear terminals are provided for remote sensing (compensation for lead losses) or remote programming of the output voltage. A dissipation monitor* insures safe operation of the internal power transistors when remote programming is used.

The Model 4050 is designed for bench use. Panel adapters are available for mounting one or two units in a 19 inch rack.

1.2 ELECTRICAL SPECIFICATIONS

Output: 0 to 40 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 millivolts for line voltage variations of ± 10% or 100% changes in rated load.

Ripple and Noise: Less than 500 microvolts rms at 60 Hz line, less than 2 millivolts 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% + 3 millivolts per 8 hour period after warm-up at constant line, load and ambient temperature.

Temperature Coefficient: 0.02% + 2 millivolts per degree C.

Programming Constant: 200 ohms per volt approximately.

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

* Patent applied for.

Current Limiting: 0 to 5 amperes, continuously adjustable. A panel indicator is illuminated when the power supply is operating in its current limited mode.

Overvoltage Crowbar: 5 to 50 volts, continuously adjustable. The panel LIMIT lamp is illuminated when the overvoltage crowbar has "fired".

Operating Temperature Range: 0 to 60°C.

Output Polarity: Either output terminal may be connected to ground. The maximum potential between any terminal and ground must not exceed 300 volts.

1.3 MECHANICAL SPECIFICATIONS

The Model 4050 is housed in a portable steel cabinet finished in blue vinyl enamel. The front panel is brushed, anodized aluminum with etched black lettering.

Dimensions: 7-3/4 inches x 8-5/8 inches X 13-1/2 (depth behind front panel).

Weight: 33 pounds.

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 OVERVOLTAGE CROWBAR

To set the overvoltage trip point, adjust VOLTAGE control to the desired OV and slowly rotate counterclockwise the OVERVOLTAGE CROWBAR control until the LIMIT lamp turns on. To reset, adjust the VOLTAGE control below the overvoltage trip point and turn the AC switch to CROWBAR RESET, then on again.

2.5 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:

$V_1 = V_{out} - I_1 \times R_{1w}$ where V_{out} = supply output voltage
$V1$ = voltage across 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, 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+ and S- terminals to the positive and negative power leads respectively at 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 microfarad capacitor of suitable voltage rating should be connected across the sensing terminals.

2.6 REMOTE VOLTAGE PROGRAMMING

This feature allows the output voltage to be controlled remotely. However, because of the regulator system employed, 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 40 VDC output, the supply may be programmed from 37 VDC to 41 VDC with a 5 ampere load, or from 25 VDC to 46 VDC with a 2.5 ampere load. The dissipation monitor circuit will automatically limit the series pass dissipation if the unit is operated outside its safe area. The LIMIT light will go on when the monitor circuit is operating.

NOTE: The programming terminals are sensitive to noise and line ripple 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, transformers, AC generators, 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 off.

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

$R_p = V_o \times 200$ where R_p = programming resistance in ohms
V_o = desired output voltage change in volts

c) Connect the load and set the AC switch on. The series pass transistors will be protected from excessive dissipation by the dissipation monitoring circuit. The LIMIT lamp will light if operation beyond a safe range occurs.

<u>CAUTION:</u> 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 4050 uses a conventional series regulator to control output from a variable voltage full-wave rectifier. Series pass transistors Q3 through Q6 act as the control elements. The voltage drop across these transistors is adjusted by a high gain, DC amplifier 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 T2 is bridge rectified by CR5 and filtered by capacitor C7.

3.3 SERIES PASS ELEMENT

Series pass transistors Q3 through Q6 are connected in parallel. Base drive is provided by Q7 connected as a Darlington amplifier.

3.4 CONTROL AMPLIFIER

Transistor Q11 compares the DC output voltage with the voltage across reference zener VR3. An increase in the output voltage will cause Q11 collector current to fall, reducing the collector current of Q10. This in turn will reduce the collector currents of Q7 and the series pass network and the output voltage will fall. Compensation for load current changes is provided by R33. CR12 compensates for temperature effects.

3.5 DISSIPATION MONITOR

Q8 monitors the voltage across the series pass transistors. Q9 monitors the voltage across load current sensing resistor R34. Should either of these voltages rise above the level set by the potentiometer, R27 or R29 and R32, Q8 and Q9 will start to conduct, preventing the load current from rising further.

3.6 AUXILIARY REGULATOR

Zener diode VR1 provides regulated 20 vdc for the semiconductors in the control amplifier and dissipation monitor. Zener diode VR3 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, Q2 and VR2 maintain a constant current through VR3 and are compensated against line voltage and temperature changes.

3.7 LIMIT INDICATOR

When the unit is in the current or dissipation limiting mode, Q11 will be in saturation and Q1 will be cut off as a result. This will allow lamp DS2 to light. As soon as Q11 comes out of saturation, Q1 will start to conduct and the lamp will no longer have the voltage needed to sustain ionization.

3.8 PHASE SHIFT NETWORKS

Each transistor and its associated circuitry will introduce some phase shift. Networks such as R39 and C10 correct the gain and phase shift of the DC amplifier and prevent oscillation.

SECTION 4
MAINTENANCE

4.1 MAINTENANCE

Under normal conditions, no special maintenance of the Model 4050 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:

a) Maximum Voltage Adjustment

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

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

3. Adjust trimmer potentiometer R48 until the panel voltmeter reads 40 volts.

b) Load Regulation

1. Repeat steps 1 and 2 in paragraph a).

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

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

4. Connect an 8 ohm, 200 watt load between the rear panel DC+ and DC- terminals. Adjust potentiometer R33 until the voltmeter reading is the same with or without load.

c) Meter Calibration

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

2. Connect a 0 to 10A ammeter in series with an 8 ohm, 200 watt load between the DC+ and DC- terminals.

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

4. Adjust potentiometer R16 until panel meter indicates 5 amperes.

d) Current Limiter Adjustment

1. Energize the power supply. Rotate the VOLTAGE and CURRENT controls fully clockwise.

2. Connect a 0 to 10A external ammeter in series with a 7 ohm, 250 watt load between the DC+ and DC- terminals.

3. Adjust R29 until the external ammeter indicates 5.5A.

e) Dissipation Limiter Adjustment

1. Connect the power supply to an AC source set to 125 VAC. Set the METER FUNCTION switch to A. Rotate the CURRENT control completely clockwise. Turn VOLTAGE control completely counter-clockwise.

2. Short circuit the DC+ and DC- terminals.

3. Connect a 0-50 VDC meter between the DC- output terminal and test point 14 on the printed circuit board.

4. Turn VOLTAGE control fully clockwise to set power supply into the dissipation limit region. The panel meter will indicate increased output current as the control is turned clockwise and then suddenly will reverse and decrease as the control reaches maximum position.

5. Turn VOLTAGE control counterclockwise until the 0-50 VDC meter reads approximately 37V.

6. Turn trimmer adjustment R27 completely counterclockwise. Then adjust clockwise slowly until panel meter reads 3 amperes.

7. Readjust VOLTAGE control to 37V.

8. Readjust R27 until panel meter reads 3 amperes.

9. Repeat steps 7 and 8 until voltmeter reads 37V and the panel meter reads 3 amperes at the same time.

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 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 revaluated 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:

MS	1028	A
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, ceramic disc, .05 μf, 600 vdc	98095	CC-34-6
C2	Capacitor, electrolytic, 100 μf, 80 vdc	98095	CE-91-.80
C3	Capacitor, plastic film, 0.1 μf, 200 vdc	98095	CP-17-2
C4	Capacitor, electrolytic, 51 μf, 25 vdc	98095	CEX-51-25
C5	Capacitor, plastic film, .001 μf, 200 vdc	98095	CP-24-2
C6	Capacitor, plastic film, 0.1 μf, 200 vdc	98095	CP-17-2
C7	Capacitor, electrolytic, 10,000 μf, 75 vdc	98095	CE-103-75
C8	Capacitor, plastic film, .001 μf, 200 vdc	98095	CP-24-2
C9	Capacitor, plastic film, .01 μf, 200 vdc	98095	CP-16-2
C10	Capacitor, plastic film, .0033 μf, 200 vdc	98095	CP-18-2
C11	Capacitor, plastic film, .01 μf, 200 vdc	98095	CP-16-2
C12	Capacitor, electrolytic, 680 μf, 50 vdc	98095	CE-681-50
C13	Capacitor, electrolytic, 20 μf, 100 vdc	98095	CE-103-1
C14	Capacitor, ceramic disc, 1 μf, 3 vdc	98095	CC-100M-3AD
C15	Capacitor, plastic film, 0.22 μf, 200 vdc	98095	CP-22-2
C16	Capacitor, ceramic disc, 1 μf, 3 vdc	98095	CC-100M-3AD
C17	Capacitor, ceramic disc, 0.1 μf, 600 vdc	98095	CC-37-6
CR1 thru CR3	Diode, silicon	98095	GI88
CR4	Diode, silicon controlled rectifier complementary	98095	C13F
CR5	Bridge rectifier	83003	VB225F
CR9	Diode, stabistor	98095	SI250A (red dot)
CR10 thru CR12	Diode, silicon	98095	GI88
CR13	Diode, silicon	98095	MS9918-2
CR14	Diode, silicon	98095	SY241N
DS1	Pilot Light Assembly (red)	98095	PLA-13
DS2	Pilot Light Assembly (clear)	98095	PLA-15
F1	Fuse, 5A, Slo-Blo	71400	MDX
F2	Fuse, 7.5A, Fast-Blo	71400	AGC
M1	Meter, 0-40V/0-5A	98095	MVA-133
Q1	Transistor, silicon, PNP	98095	2N4888
Q2	Transistor, silicon, PNP	98095	MS1028A
Q3 thru Q6	Transistor, silicon, NPN	98095	ST1700C(red dot)
Q7	Transistor, silicon, NPN	98095	MS1700A
Q8, Q9	Transistor, silicon, NPN	98095	TI2270/U
Q10	Transistor, silicon, PNP	98095	MS1028A
Q11	Transistor, silicon, NPN	98095	TI2270/U
Q12	Transistor, silicon, NPN	98095	2N2243A

ELECTRICAL PARTS LIST

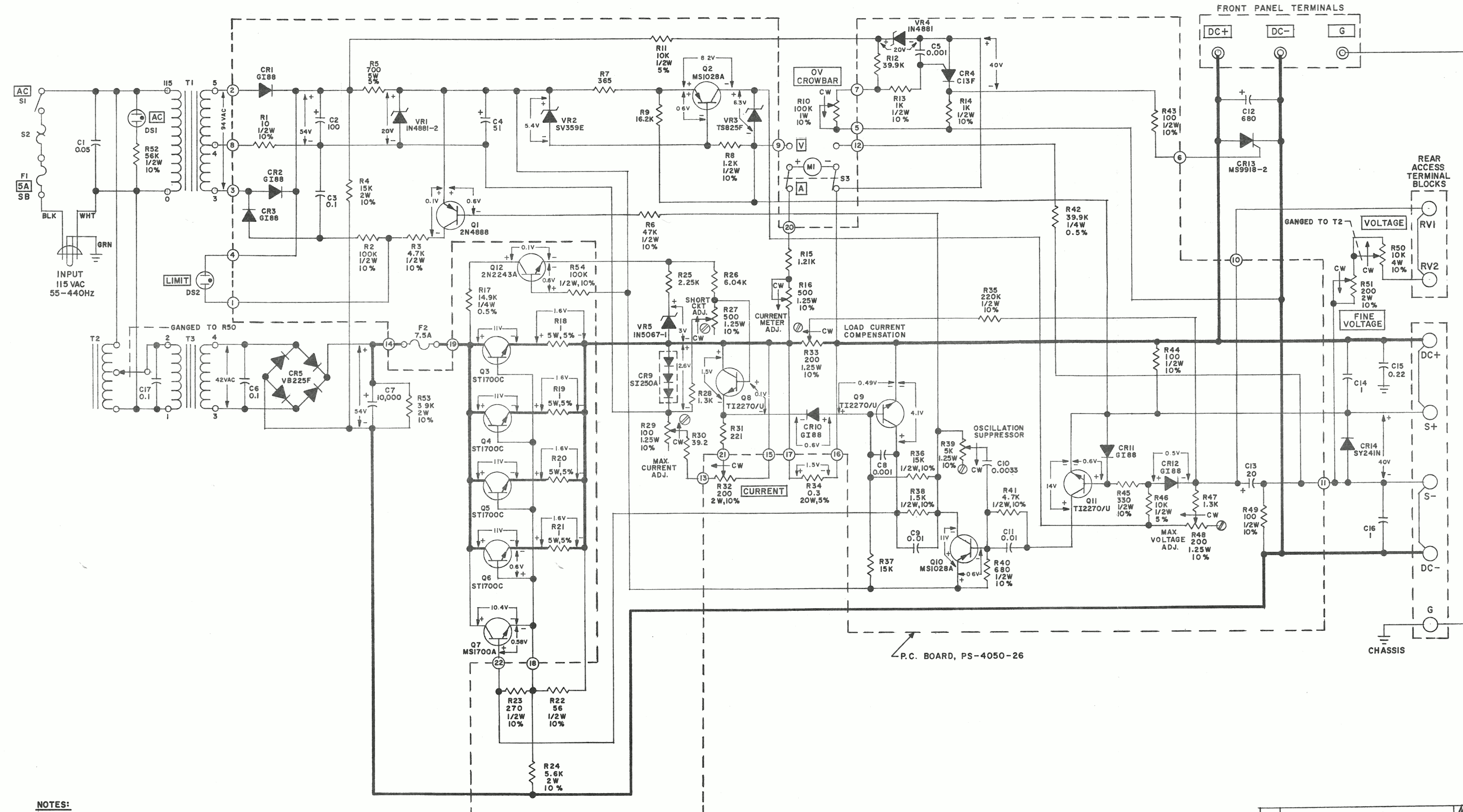
Circuit Number	Description	Mfr Code Number	Part Number
R1	Resistor, composition, 10 Ω, ± 10%, 1/2 w	01121	EB1001
R2	Resistor, composition, 100 kΩ, ± 10%, 1/2 w	01121	EB1045
R3	Resistor, composition, 4.7 kΩ, ± 10%, 1/2 w	01121	EB4721
R4	Resistor, composition, 15 kΩ, ± 10%, 2 w	01121	HB1531
R5	Resistor, wirewound, 700Ω, ± 5%, 5 w	98095	RW-701-3RA
R6	Resistor, composition, 47 kΩ, ± 10%, 1/2 w	01121	EB4731
R7	Resistor, precision, metal film, 365Ω, ± 1%, 1/4 w	98095	RD-3650-1QA
R8	Resistor, composition, 1.2 kΩ, ± 5%, 1/2 w	01121	EB1225
R9	Resistor, precision, metal film, 16.2 kΩ, ± 1%, 1/4 w	98095	RD-1622-1QA
R10	Resistor, variable, composition, 100 kΩ, ± 10%, 1 w	98095	RVC104B4-1
R11	Resistor, composition, 10 kΩ, ± 5%, 1/2 w	01121	EB1035
R12	Resistor, precision, metal film, 39.9 kΩ, ± 1%, 1/4 w	98095	RD-3992-1QA
R13, R14	Resistor, composition, 1 kΩ, ± 10%, 1/2 w	01121	EB1021
R15	Resistor, precision, metal film, 1.21 kΩ, ± 1%, 1/4 w	98095	RD-1211-1QA
R16	Resistor, wirewound, variable, 500Ω, ± 10%, 1-1/4 w	98095	RWTP-501-C4
R17	Resistor, precision, metal film, 14.9 kΩ, ± 0.5%, 1/4 w	98095	RD-1492-6QA
R18 thru R21	Resistor, wirewound, 1.0 Ω, ± 5%, 5 w	98095	RW-010-3RA
R22	Resistor, composition, 56Ω, ± 10%, 1/2 w	01121	EB5601
R23	Resistor, composition, 270Ω, ± 10%, 1/2 w	01121	EB2711
R24	Resistor, composition, 5.6 kΩ, ± 10%, 2 w	01121	HB5621
R25	Resistor, precision, metal film, 2.25 kΩ, ± 1%, 1/4 w	98095	RD-2251-1QA
R26	Resistor, precision, metal film, 6.04 kΩ, ± 1%, 1/4 w	98095	RD-6041-1QA
R27	Resistor, wirewound, variable, 500Ω, ± 10%, 1-1/4 w	98095	RWTP-501-C4
R28	Resistor, precision, metal film, 1.3 kΩ, ± 1%, 1/4 w	98095	RD-132-1QA
R29	Resistor, wirewound, variable, 100Ω, ± 10%, 1-1/4 w	98095	RWTP-101-C4
R30	Resistor, precision, metal film, 39.2Ω, ± 1%, 1/4 w	98095	RD-39F2-1QA
R31	Resistor, precision, metal film, 221Ω, ± 1%, 1/4 w	98095	RD-2210-1QA
R32	Resistor, variable, wirewound, 200Ω, ± 10%, 2 w	98095	RWV201C4-.87
R33	Resistor, wirewound, variable, 200Ω, ± 10%, 1-1/4 w	98095	RWTP-201-C4
R34	Resistor, wirewound, 0.3Ω, ± 5%, 20 w	98095	RW-003-3F
R35	Resistor, composition, 220 kΩ, ± 10%, 1/2 w	01121	EB2241
R36	Resistor, composition, 15 kΩ, ± 10%, 1/2 w	01121	EB1531
R37	Resistor, precision, metal film, 15 kΩ, ± 1%, 1/4 w	98095	RD-153-1QA
R38	Resistor, composition, 1.5 kΩ, ± 10%, 1/2 w	01121	EB1521
R39	Resistor, wirewound, variable, 5 kΩ, ± 10%, 1-1/4 w	98095	RWTP-502-C4
R40	Resistor, composition, 680 Ω, ± 10%, 1/2 w	01121	EB6811
R41	Resistor, composition, 4.7 kΩ, ± 10%, 1/2 w	01121	EB4721
R42	Resistor, precision, metal film, 39.9 kΩ, ± 0.5%, 1/4 w	98095	RD-3992-6QA
R43, R44	Resistor, composition, 100 Ω, ± 10%, 1/2 w	01121	EB1011
R45	Resistor, composition, 330 Ω, ± 10%, 1/2 w	01121	EB3311
R46	Resistor, composition, 10 kΩ, ± 5%, 1/2 w	01121	EB1035
R47	Resistor, precision, metal film, 1.3 kΩ, ± 1%, 1/4 w	98095	RD-132-1QA
R48	Resistor, wirewound, variable, 200Ω, ± 10%, 1-1/4 w	98095	RWTP-201-C4
R49	Resistor, composition, 100Ω, ± 10%, 1/2 w	01121	EB1011

ELECTRICAL PARTS LIST

Circuit Number	Description	Mfr Code Number	Part Number
R50	Resistor, variable, wirewound, 10 kΩ, ± 10%, 4 w	98095	RWV103M4-5.06
R51	Resistor, variable, wirewound, 200Ω, ± 10%, 2 w	98095	RWV201C4-.87
R52	Resistor, composition, 56 kΩ, ± 10%, 1/2 w	01121	EB5631
R53	Resistor, composition, 3.9 kΩ, ± 10%, 2 w	01121	HB3921
R54	Resistor, composition, 100 kΩ, ± 10%, 1/2 w	01121	EB1041
S1	Switch, toggle, SPST	98095	ST-5
S2	Thermostat	98095	STH-2
S3	Switch, toggle, DPDT	98095	ST-16
T1	Transformer, auxiliary	98095	TTH-27
T2	Transformer, variable, auto	98095	TTV-3B
T3	Transformer	98095	TTM-4050(*)
VR1	Diode, silicon, zener	98095	1N4881-2(vio dot)
VR2	Diode, silicon, zener	98095	SV359E
VR3	Diode, silicon, zener	98095	TS825F
VR4	Diode, silicon, zener	98095	1N4881
VR5	Diode, silicon, zener	98095	1N5067-1(red dot)

CODE LIST OF MANUFACTURERS:

01121	Allen Bradley Co.	Milwaukee, Wisconsin
71400	Bussman Mfg. Division	St. Louis, Missouri
83003	Varo, Inc.	Garland, Texas
98095	Power Designs. Inc.	Westbury, New York



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTORS ARE IN OHMS, 1/4W, 1%.
   ALL CAPACITORS ARE IN MICROFARADS.
2. NUMERIALS IN CIRCLES INDICATE PRINTED CIRCUIT BOARD TERMINAL NUMBERS.
3. ALL FRONT PANEL CONTROL FUNCTIONS AND INDICATORS ARE SHOWN IN RECTANGLES. ALL OTHER CONTROLS ON P.C. BOARD.
4. VOLTAGES INDICATED ARE MEASURED WITH 115VAC, 60Hz INPUT WITH A 36VDC OUTPUT AND 5A LOAD. MEASUREMENTS ARE MADE WITH A 20,000 Ω/VOLT METER FOR DC AND A 1000 Ω/VOLT METER FOR AC. VOLTAGES ARE DC UNLESS OTHERWISE NOTED.

NOTICE

SYM.	DESCRIPTION	APPD	DATE
C	REVISED, ECN 2622		2/16/76
B	REVISED, ECN 2605		1/7/76
A	RELEASED		5/6/75

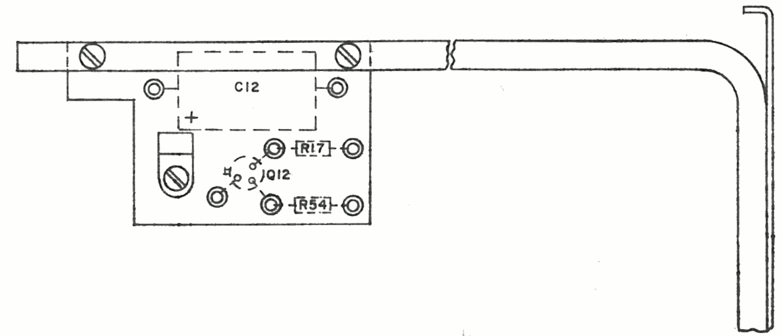
REVISIONS

DRAWING NO. PS-4050-1 REV. C

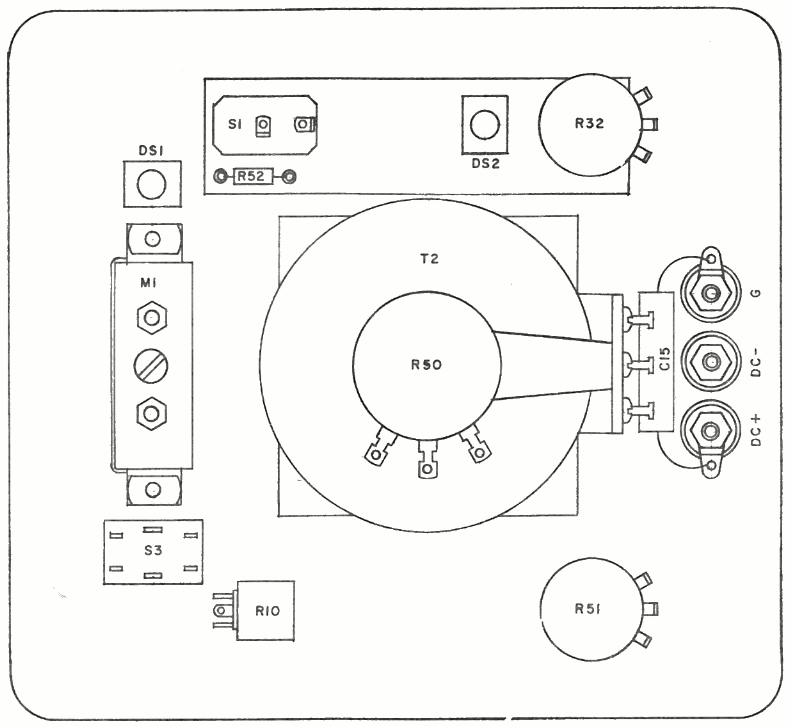
TITLE SCHEMATIC, MODEL 4050

DRAWN HC | CHECKED | APPROVED
DATE 9/6/74 | DATE 5/6/75 | DATE 5/6/75

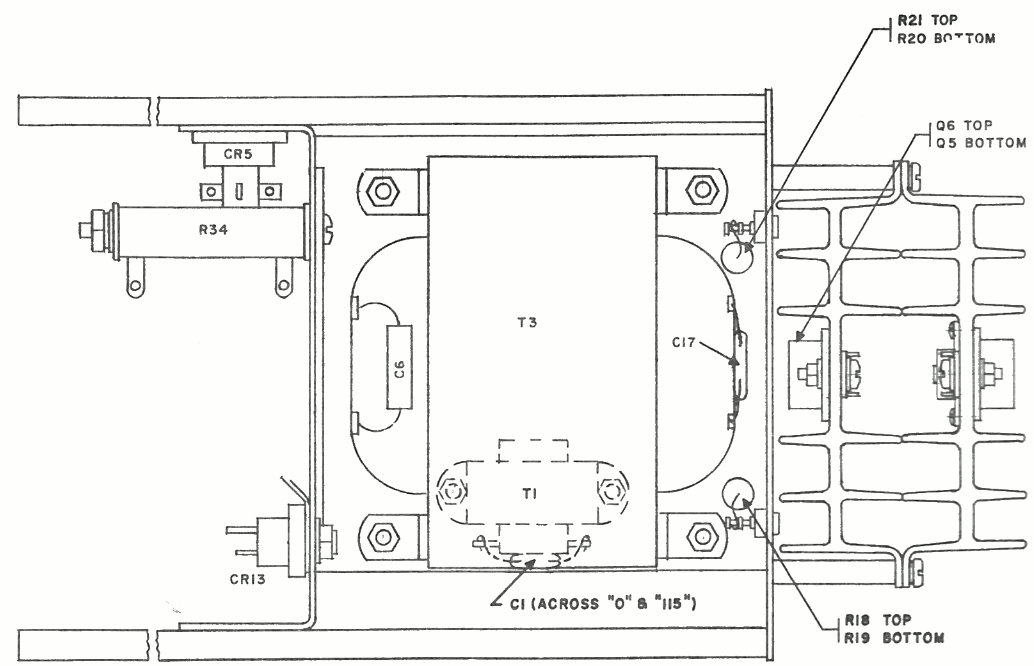
Power Designs inc.
NEW YORK



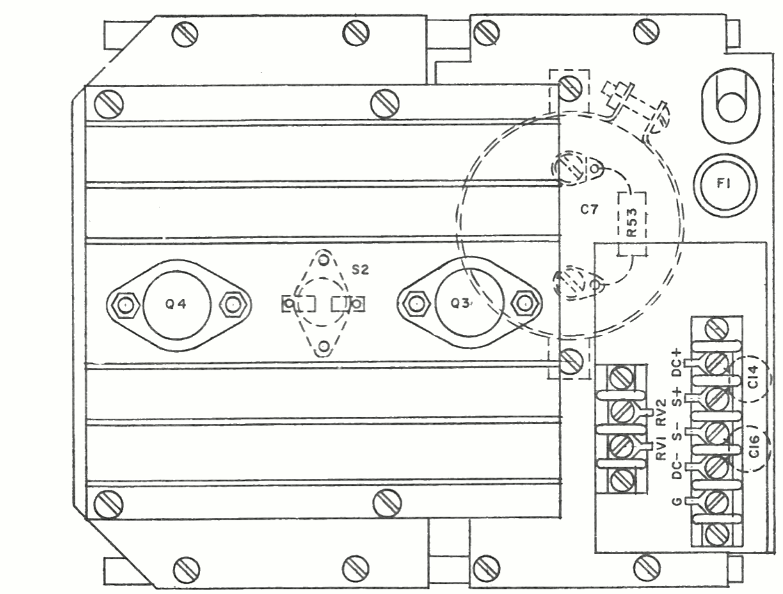
PARTIAL LEFT SIDE VIEW OF UNIT



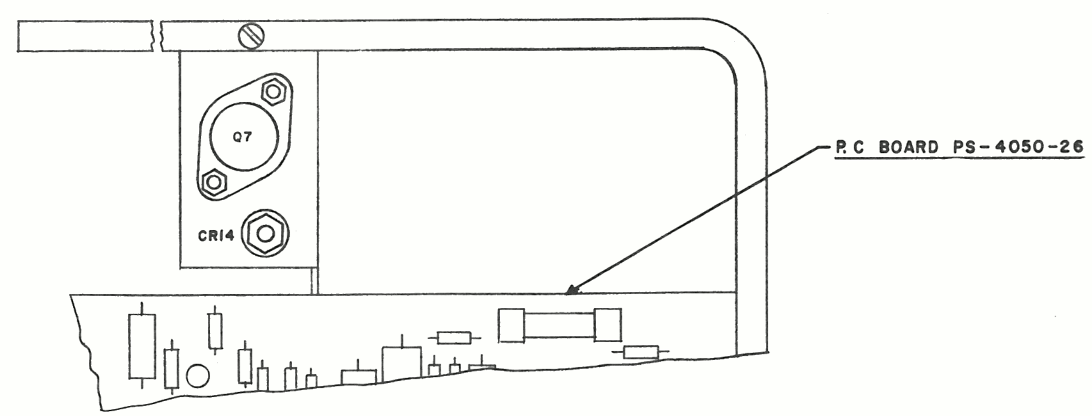
PANEL - REAR VIEW



TOP VIEW OF UNIT



REAR VIEW OF UNIT



PARTIAL RIGHT SIDE VIEW OF UNIT

SHEET 2 OF 2

SYM.	DESCRIPTION	APPD	DATE
C	REVISED, ECN 2622		9/16/76
B	REVISED, ECN 2605		1/7/76
A	RELEASED		5/6/75

REVISIONS

DRAWING NO. PS-4050-1 REV. C

TITLE LOCATION OF COMPONENTS

DRAWN HC	CHECKED	APPROVED
DATE 3/15/75	DATE 5/6/75	DATE 5/6/75

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