PS1000SWA-MS

PS1000SWA

POWER SUPPLY

OPERATOR/TECHNICAL MANUAL

Datron World Communications Inc.
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Physical damage to the equipment or its parts that does not involve defects in design, material, or workmanship, including damage by impact, liquids, temperature, or gases.

Damage to the equipment or its parts caused by lightning, static discharge, voltage transients, or application of incorrect supply voltages.

Defects or failures caused by unauthorized attempts to repair or modify the equipment.

Defects or failures caused by Buyer abuse or misuse.

Return of Equipment - Domestic: To obtain performance of any obligation under this warranty, the equipment must be returned freight prepaid to the Technical Support Services Group, Datron World Communications Inc., 3030 Enterprise Court, Vista, California 92083. The equipment must be packed securely. Datron shall not be responsible for any damage incurred in transit. A letter containing the following information must be included with the equipment.

a. Model, serial number, and date of installation
b. Name of dealer or supplier of the equipment
c. Detailed explanation of problem
d. Return shipping instructions
e. Telephone or fax number where Buyer may be contacted

Datron will return the equipment prepaid by United Parcel Service, Parcel Post, or truck. If alternate shipping is specified by Buyer, freight charges will be made collect.

Return of Equipment - International: Contact Datron or your local Representative for specific instructions. Do not return equipment without authorization. It is usually not possible to clear equipment through U.S. Customs without the correct documentation. If equipment is returned without authorization, Buyer is responsible for all taxes, customs duties, clearance charges, and other associated costs.

Parts Replacement: The following instructions for the supply of replacement parts must be followed:

a. Return the parts prepaid to "Parts Replacement," Datron World Communications Inc., 3030 Enterprise Court, Vista, California 92083; and
b. Include a letter with the following information:

1. Part number
2. Serial number and model of equipment
3. Date of installation

Parts returned without this information will not be replaced. In the event of a dispute over the age of the replacement part, components date-coded over 24 months previously will be considered out of warranty.

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Safety Considerations

This product and manual must be thoroughly understood before attempting installation and operation. To do so without proper knowledge can result in equipment failure and bodily injury.

Caution: Before applying ac power, be sure that the equipment has been properly configured for the available line voltage. Attempted operation at the wrong voltage can result in damage and voids the warranty. See the manual's section on Installation.

Earth Ground: All Datron products are supplied with a standard, 3-wire, grounded ac plug. DO NOT attempt to disable the ground terminal by using 2-wire adapters of any type. Any disconnection of the equipment ground causes a potential shock hazard that could result in personal injury. DO NOT operate any equipment until a suitable ground has been established. Consult the manual section on grounding.

Servicing: Only trained personnel should perform servicing. To avoid electric shock, DO NOT open the case unless qualified to do so.

Various measurements and adjustments described in this manual are performed with ac power applied and the protective covers removed. Capacitors (particularly the large power-supply electrolytics) can remain charged for a considerable time after the unit has been shut off. Use particular care when working around them, as a short circuit can release sufficient energy to cause damage to the equipment and possible injury.

To protect against fire hazard, always replace line fuses with ones of the same current rating and type (normal delay, slow-blow, etc.). DO NOT use higher-value replacements in an attempt to prevent fuse failure. If fuses are failing repeatedly, this indicates a probable defect in the equipment that needs attention.

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FIGURES

TABLES

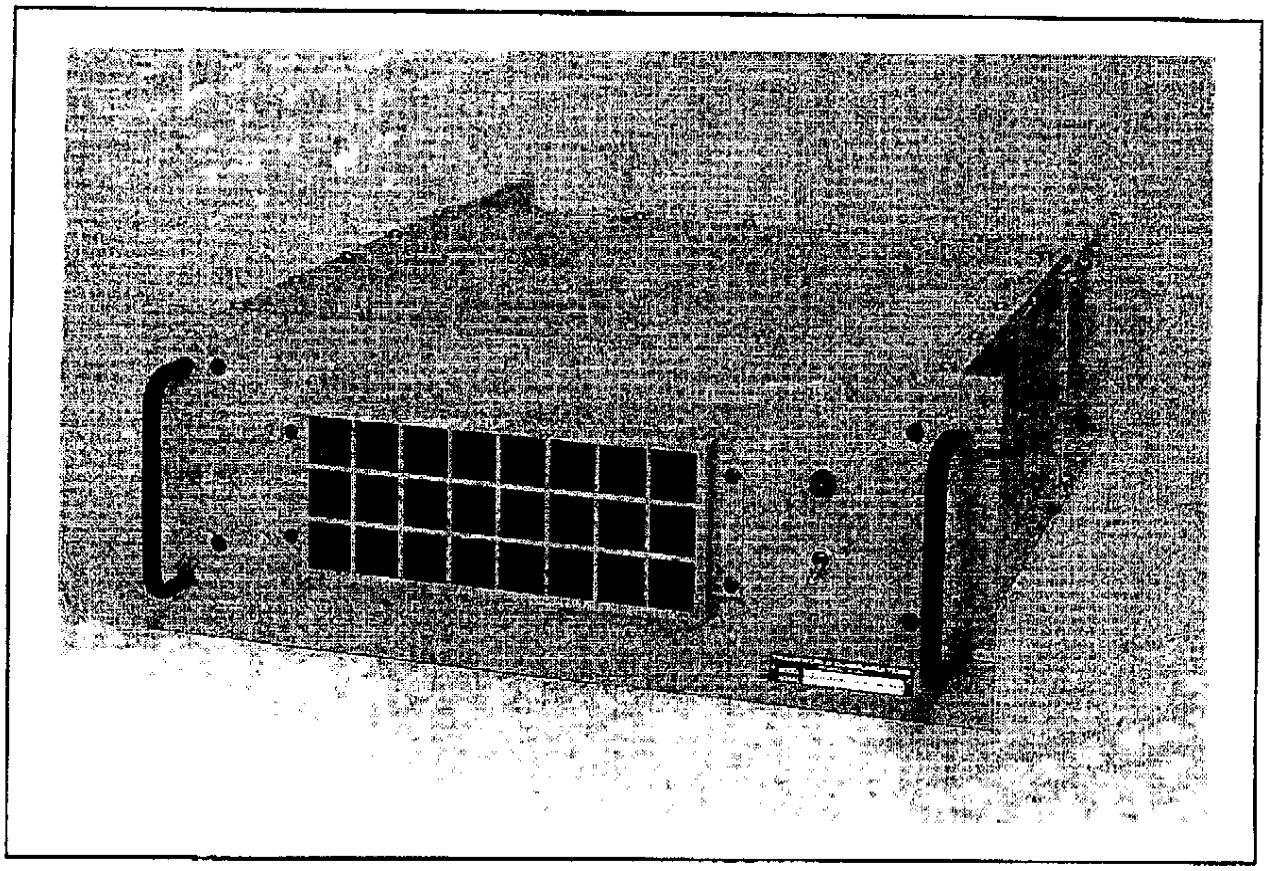

FIGURE 1-1.
PS1000SWA

CHAPTER 1
GENERAL INFORMATION

1.0 GENERAL DESCRIPTION

The PS1000SWA is a rack mount heavy-duty switching power supply featuring both 13.8 volt and 28 volt output voltages. It is designed to provide primary power for Transworld's TW7000 (13.8 volts) and the TW1000B (28 volts) power amplifier. The supply has a power factor corrected AC input, and runs from 220 VAC nominal line voltage.

1.2 SPECIFICATIONS

Table 1-1 describes the technical specifications of the PS1000SWA power supply.

TABLE 1-1.
Input/Output Specifications.

Input Specifications

Input Range :	180- 265 VAC, 47 - 63 Hz single phase
Inrush Current:	Nominal full load running current at 230 VAC
Fusing:	Rear panel AC fuse 15 A
Power Factor:	0.99 at full load
Total Harmonic Distortion:	5%
AC Input Connector:	NEMA 6-15

Output Specifications

Output Power:	(TOTAL 3000 WATTS) 28 VDC, 100 AMPS 13.8 VDC, 20 AMPS
Maximum Ripple:	0.5 V p-p
Protection:	Overvoltage, overcurrent

General

Temperature Range

Operational:	-10° C to +50° C
Storage:	-40° C to +70° C
28 Volt DC Output Connector:	TWC # 613012
Mating Connector:	TWC # 613013 (straight)/610062 (clamp) TWC # 613031 (90 degree)/610062 (clamp)
13.8 Volt DC Output Connector:	TWC # 614013
Mating Connector:	TWC # 614012/610065 (clamp)
Size (W x D x H):	19 in x 18 in x 7 in (48 cm x 46 cm x 18 cm)
Weight:	27 lbs, (12 kg)
Standard Cables to the PS1000SWA:	C991508 (28 V) to TW1000B C991541 (28 V) to TW1000B C991907 (13.8 V) to TW7000 C992068 (13.8 V) "Y" to TW7000/TW9000

1.3 INPUT POWER REQUIREMENTS

220 VAC line capable of suppling 3 KW.

1.4 OPTIONS AND ACCESSORIES

PS1000SWARMS:	Slide rack mount option.
PS1000SWAPSK:	Spare parts kit
PS1000SWATK:	Tool kit

CHAPTER 2
INSTALLATION

2.0 UNPACKING AND INSPECTION

The power supply should be handled with care when unpacking it. Carefully remove the equipment from its container and inspect it for possible damage that may have occurred during shipment. If damage is found, notify Trans World Communications.

If the power supply is part of a rack system, it will arrive mounted in the rack. Inspect it for possible damage that may have occurred during shipment.

Check the equipment against the packing list. Save the original container and packing materials to store or reship the equipment.

The supply comes with a standard fixed rack mount kit. A slide rack mount is available as an option.

2.1 PRE-INSTALLATION CHECK

The power supply has been completely aligned and tested prior to shipment. No pre-installation check is required.

2.2 LOCATION CONSIDERATIONS

The PS1000SWA is normally mounted in a standard 19 inch rack. Most systems are factory assembled. See Figure 2-1 for a typical rack system.

The supply is normally mounted at the bottom of the rack. Insure that there is adequate ventilation around the front and rear of the unit to allow for air flow.

2.2.1 INSTALLATION PROCEDURE

Installing the power supply involves putting it in its proper location, then attaching the external equipment necessary for the desired system configuration. The standard configuration is AC input, DC at 28 volts to the amplifier and DC at 13.8 volts to the radio. See Figure 2-2.

The power supply may sit on a table or floor, but in most cases it is installed in a 19 inch rack. The standard fixed rack mount is shown in Figure 2-3. This involves attaching the rack ears at the rear of the unit and mounting the unit into the rack.

An optional slide rack kit is available (PS1000SWARMS). In this configuration rack slides are mounted to the PS1000SWA sides, and matching rack hardware is installed in the rack. See Figure 2-4.

2.3 FRONT PANEL

The PS1000SWA has a front panel as shown in Figure 2-5. The front panel has an on/off switch and indicator light. The light will come on when the unit is powered on.

2.4 REAR PANEL

The PS1000SWA rear panel is shown in Figure 2-6.

2.4.1 INPUT POWER AC

The PS1000SWA requires a nominal 220 VAC source capable of 15 amps. The input voltage range of operation is from 180 - 265 VAC, 47 - 60 Hz. There is no voltage strapping on the unit.

2.4.1.1 INPUT POWER AC CONNECTOR

The standard AC input plug in a NEMA 6-15 plug. See Figure 2-7 for the wiring to the plug. Changing of the plug to match the customers outlet may be required in some cases. This should only be done by a qualified electrician. The wiring color code is as follows in Table 2-1. If ground is not available from the AC system, the ground lug at the rear of the unit must be used for ground. The ground stud at the rear of the unit should also be used to ground equipment and the rack chassis.

TABLE 2-1.
AC Wiring Code.

Conductor	Color
Line	Black
Neutral	White
Ground	Green

2.4.2 INPUT AC FUSEHOLDER

The Input AC Fuseholder at the rear of the unit contains a 15 amp, 5AB fuse, Transworld # 550022. To check fuse, unplug AC cord and unscrew fuse cap. Fuse must be checked with a meter.

2.4.3 28 VOLT DC OUTPUT

The 28 volt high current output is from the large 4-pin MIL-C circular connector. The mating plug is (Transworld P/N 613013, or 613031). The standard cable used between the power supply and the amplifier is C991508 or C991541. The DC connection between the power supply and the amplifier should always be as short as possible. If other cables are used make sure that the wire gauge is capable of the current draw.

NOTE

The supply can put out up to 100 amps of current.

TABLE 2-2.
28 Volt DC Pin-Out.

Pin	Description
A	+28 VDC
B	RETURN
C	RETURN
D	+28 VDC

TABLE 2-3.
13.8 Volt DC Pin-Out.

Pin	Description
A	+13.8 VDC
B	RETURN
C	RETURN
D	+13.8 VDC

2.4.4 13.8 VOLT DC OUTPUT

The 13.8 volt output is from the smaller 4-pin MIL-C circular connector. The mating plug is (Transworld P/N 614012). The standard cable used between the power supply and the TW7000 transceiver is C991907. The DC connection between the power supply and the transceiver should always be as short as possible. If other cables are used make sure that the wire gauge is capable of the current draw.

NOTE

The supply can put out up to 25 amps of current. This connector may be left unused in systems where the transceiver is powered by another source.

2.5 GROUNDING

A ground post at the rear panel of the supply is provided and should be used in the system grounding.

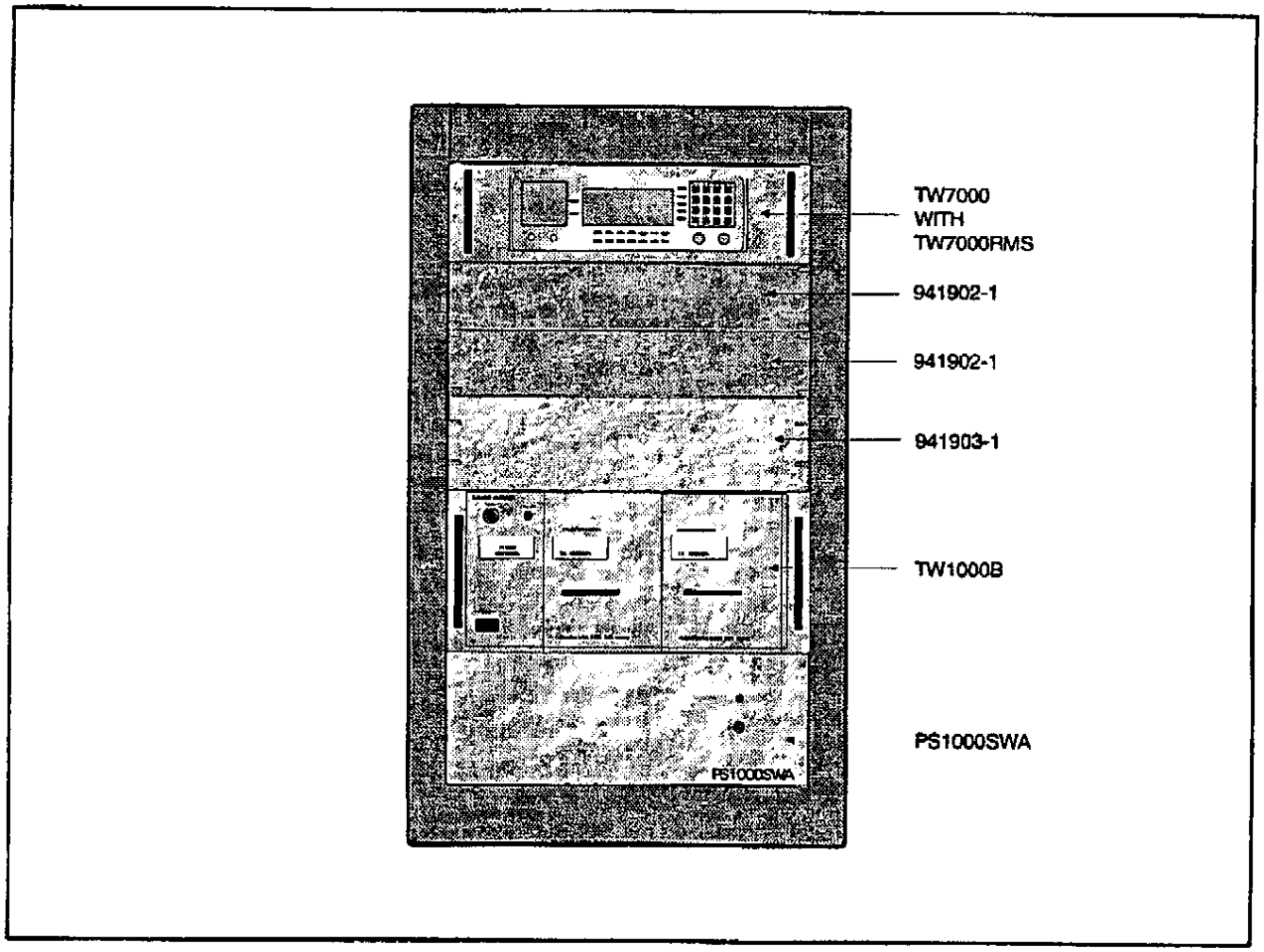

FIGURE 2-1.

TW7500.

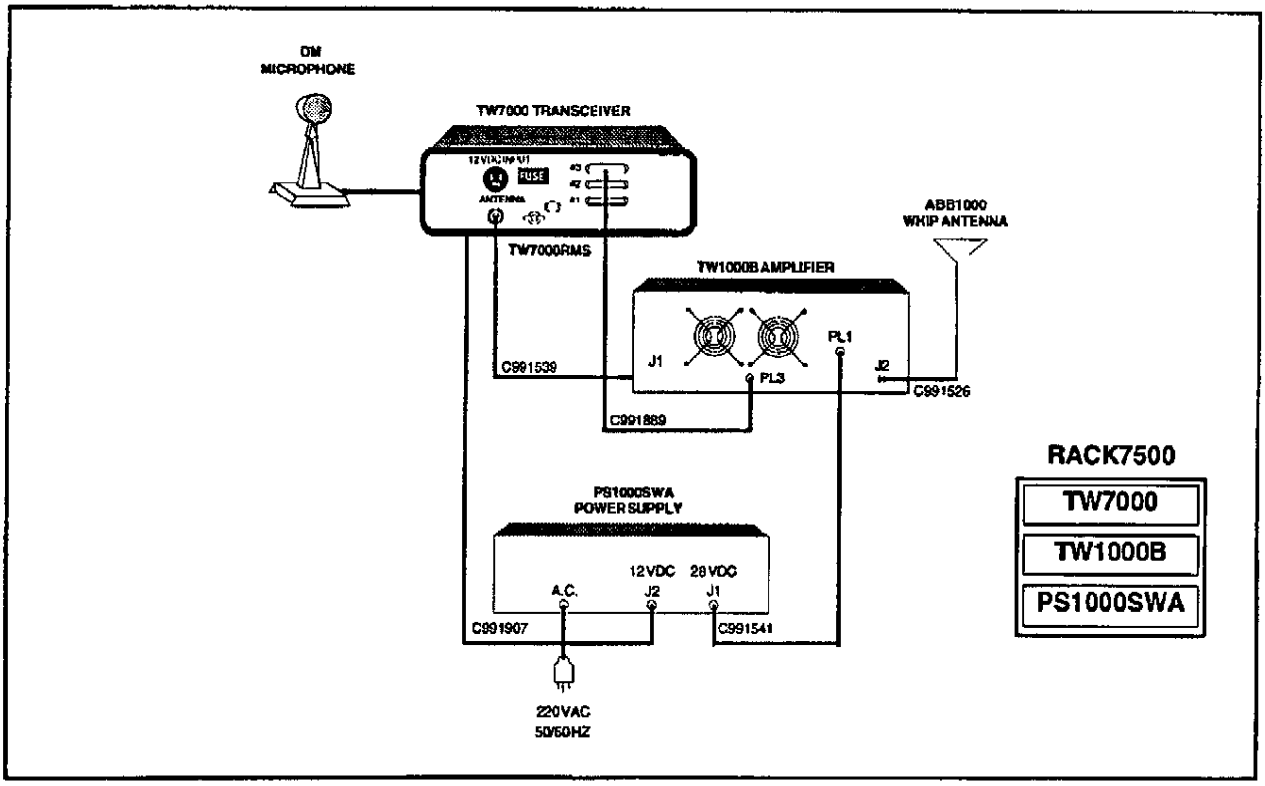

FIGURE 2-2.

Rack 7500 System Diagram.

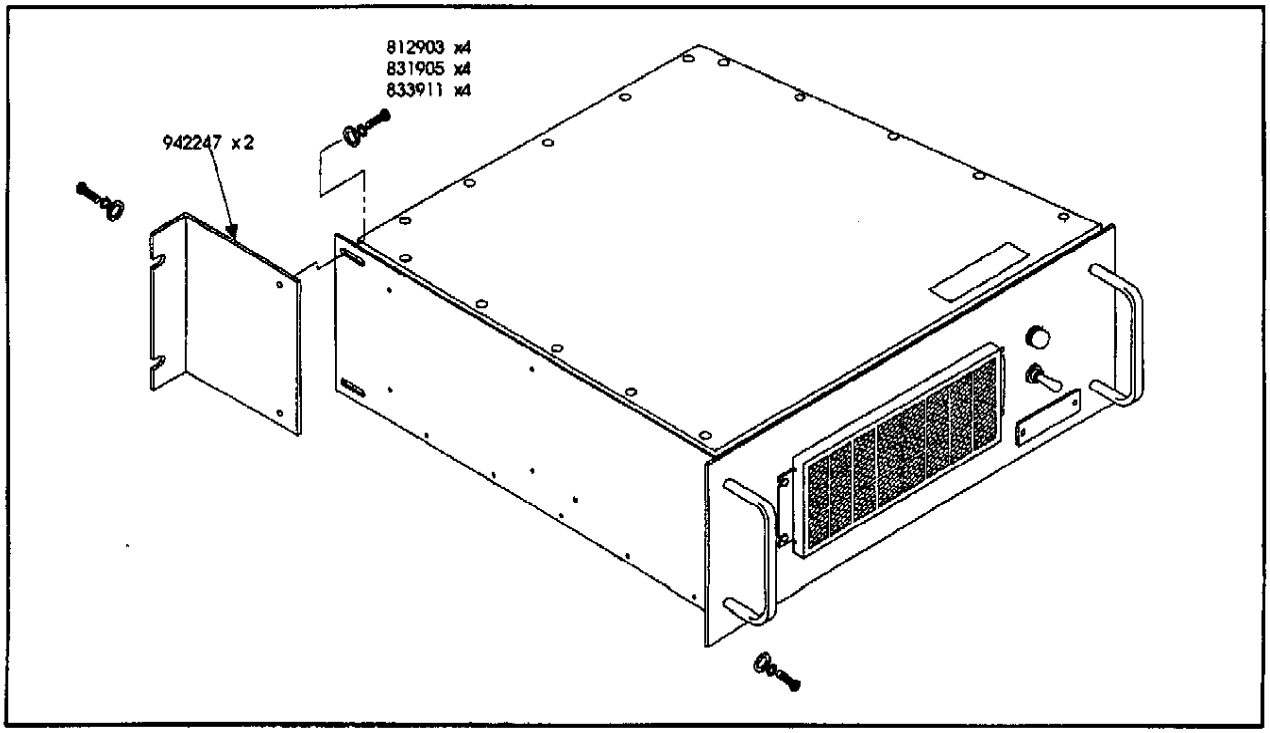

FIGURE 2-3.

Rack Mount PS1000SWA (Standard).

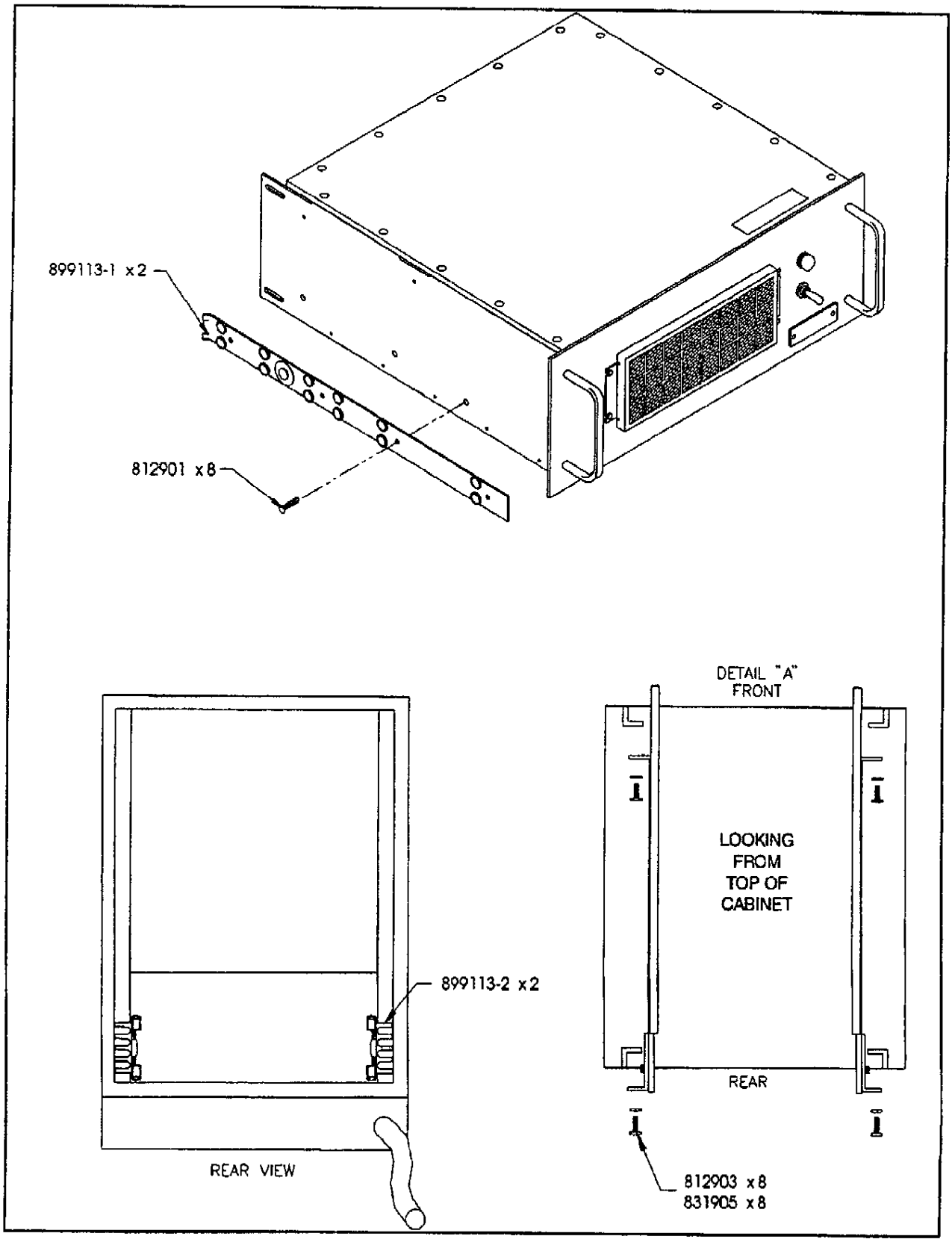

FIGURE 2-4.

Slide Rack Mount Option (PS1000SWARMS) Assembly Details.

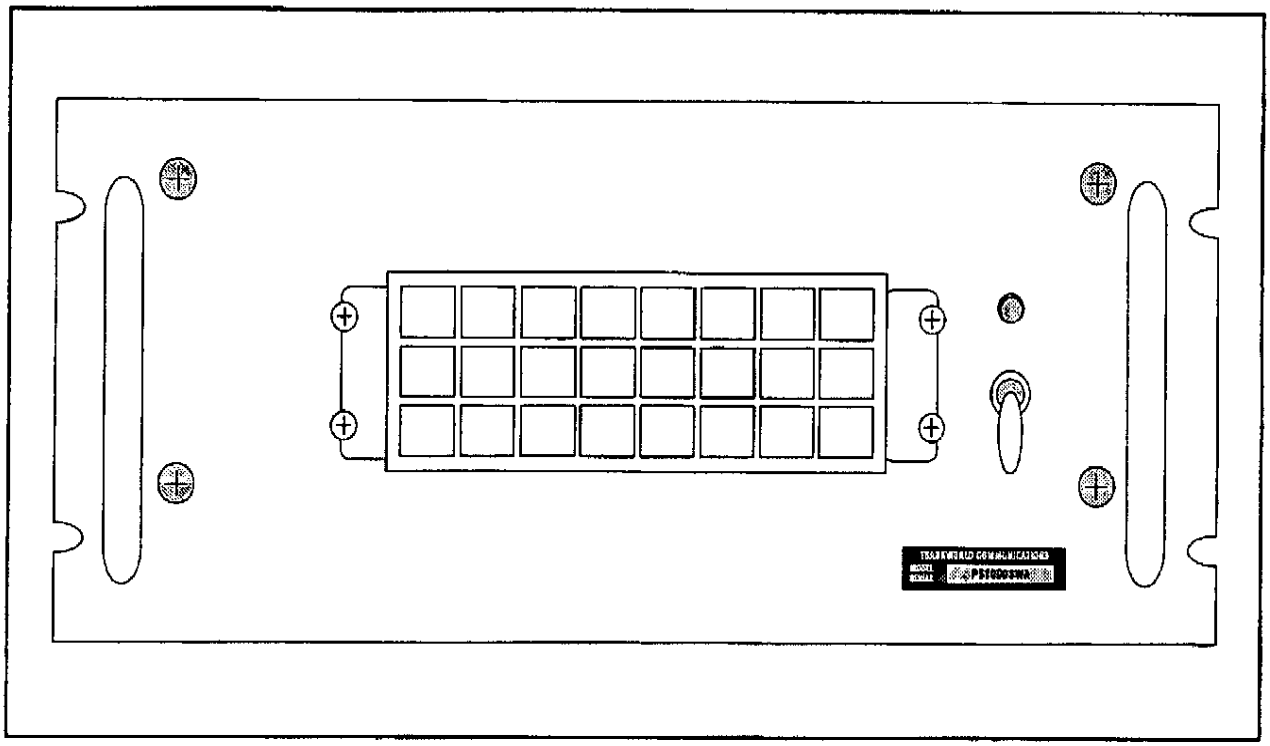

FIGURE 2-5.

Front Panel.

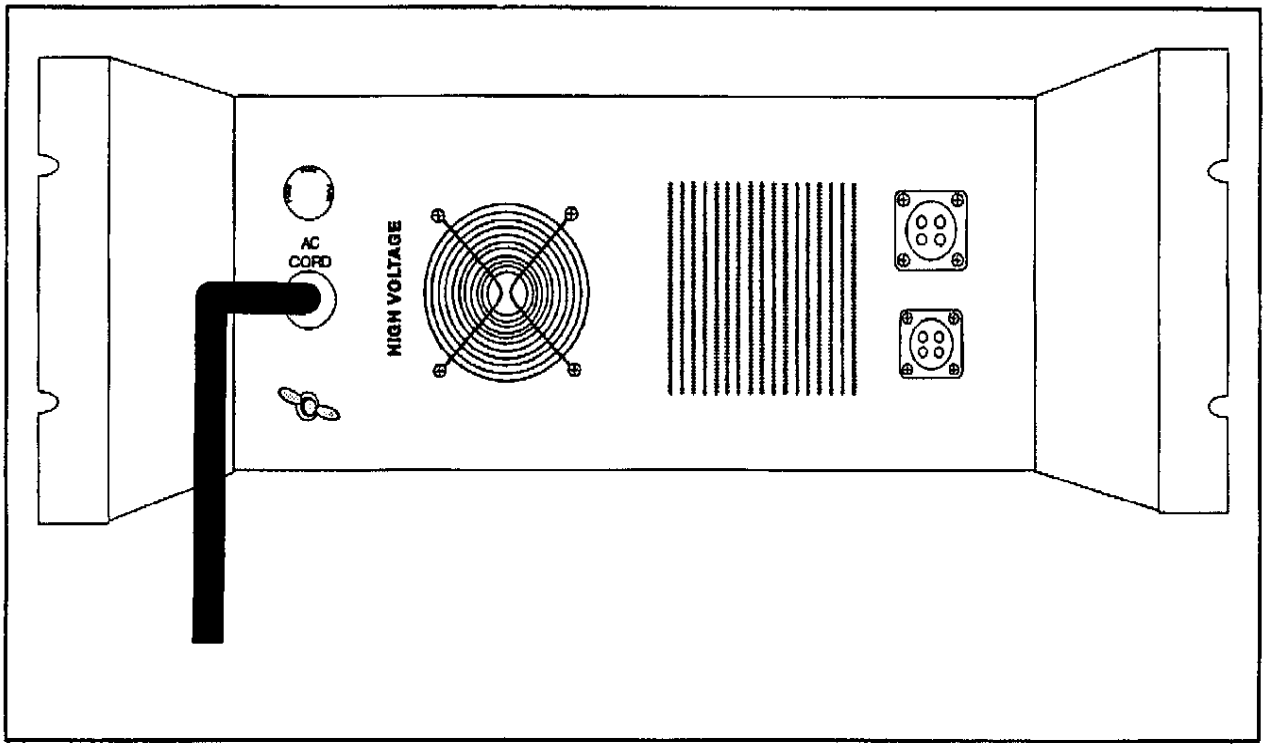

FIGURE 2-6.

Rear Panel.

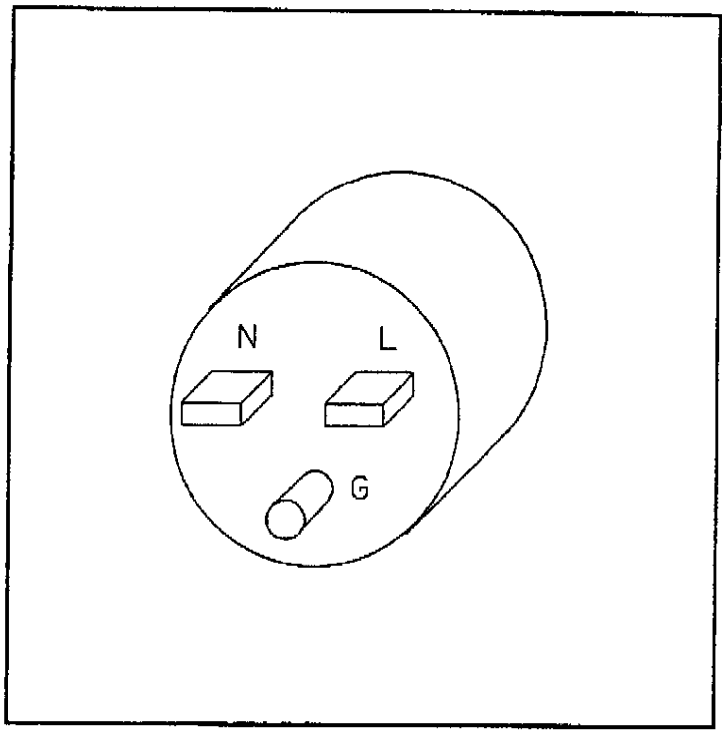

FIGURE 2-7.

AC Input Plug (NEMA 6-15).

CHAPTER 3
OPERATION

3.0 GENERAL

This section describes the operation of the PS1000SWA.

CAUTION

Unit contains high voltage and high current. No user servicable parts inside. Service only by qualified technicians. Always unplug unit when servicing.

3.1 FRONT PANEL

The Front Panel of the unit consists of an on/off toggle switch. The up position of the switch is on. An indicator light comes on when the unit is turned on. The power supply fan will also come on when the unit is turned on.

3.2 REAR PANEL

The Rear Panel has the AC input and DC outputs. There are no operator controls or functions at the rear panel. The rear panel connections should be checked before operation.

3.2.1 FUSE REPLACEMENT

Under normal use it is highly unlikely that the fuse will go out, both DC output are current limited. Should it be necessary to replace the fuse, unplug the unit and unscrew the fuse cap. The fuse is a 15 amp, 5AB (Transworld # 550022). Always replace with an equivalent fuse.

CHAPTER 4
THEORY OF OPERATION

4.0 GENERAL

The PS1000SWA is a AC-DC switching power supply. It contains a 3 KW 28 volt DC output off line switching power supply and a 28 to 13.8 volt DC-DC converter. See Figure 4-1 for a block diagram. The 28 volt output is capable of 100 amp, and is normally used to power the TW1000B amplifier. The 13.8 volt output is capable of 25 amps and is normally used to power the TW7000 HF transceiver.

4.1 28 VOLT POWER SUPPLY

The AC-DC power supply is a 5" x 8" x 11" 3000 watt switching power supply. A high frequency current mode topology using power MOS-FET's provides high power factor and efficiency.

The unit uses two stage power conversion. The first stage is a boost converter for input power factor correction. The second stage consists of two 1500 watt half-bridge forward converters used in parallel for output regulation and control. A two stage current limit allows for momentary overload but will shut down if sustained.

The 28 volt output goes through a ferrite bead for filtering, and then to the 4-pin output connector on the rear of the unit.

4.2 28 to 13.8 VOLT DC-DC CONVERTER

This DC-DC (28 to 13.8) converter consist of two modules mounted to a PCB and a heatsink. Fusing is provided at the input of each converter. The outputs are protected by output current limiting.

The 13.8 volt output goes through a filter made up of capacitors and ferrite beads. The 13.8 volt output then goes to a small 4-pin MIL circular connector on the rear of the unit.

The 13.8 volts also is used to power the lamp on the front of the unit.

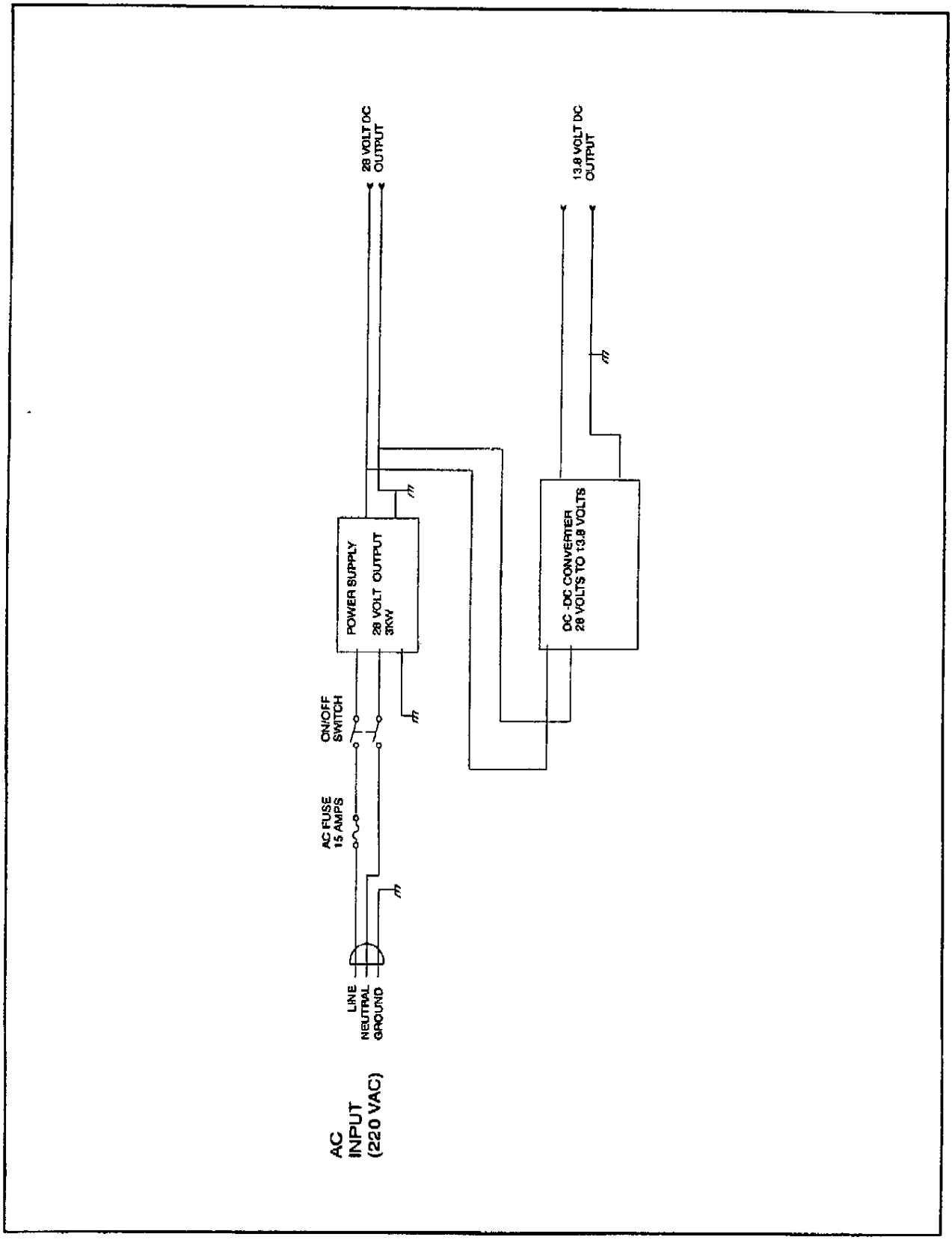

FIGURE 4-1.

Block Diagram, PS1000SWA.

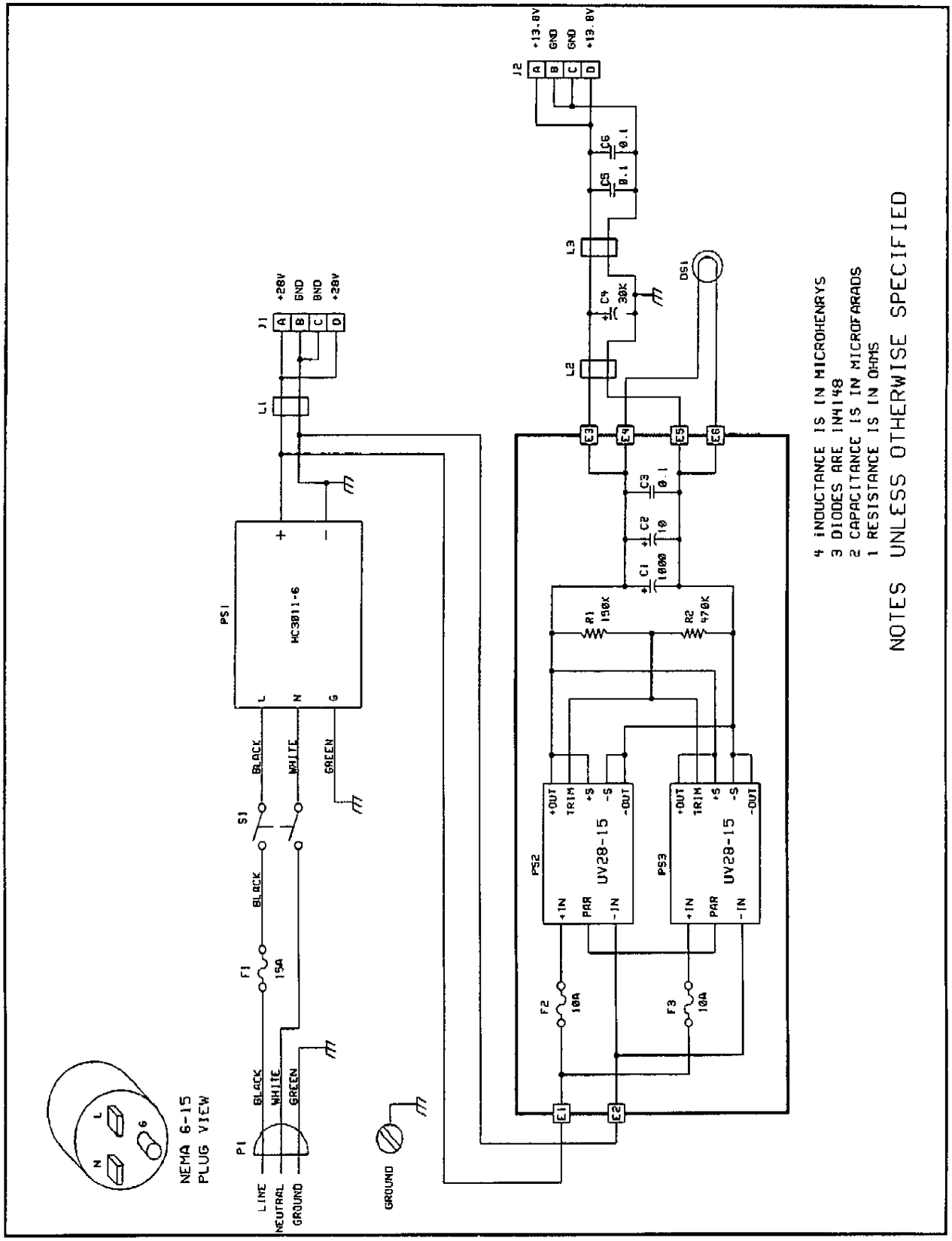

FIGURE 4-2.

Schematic, PS1000SWA.

CHAPTER 5
MAINTENANCE

5.0 GENERAL MAINTENANCE

There is no regularly schedule maintenance required for the life of the supply. The unit should be checked yearly for cable connections and fan filter element.

CAUTION

Unit contains high voltage and high current. Always turn unit off and unplug when servicing. Servicing only by qualified technician.

If the filter element is dirty, replace it. The replacement element is PN 942209. If this is not available, one can be cut out of almost any filter type material. To remove the old filter: turn off and unplug the unit, remove the four screws (810615) holding the filter element to the front panel, remove element. Installation is the reverse process.

Table 5-1 is a complete parts list for the PS1000SWA.

5.1 AC INPUT

The AC Input goes through fuse holder and switch and then into the 3KW power supply unit (see schematic in Figure 4-2). The fuse is accessible at the rear of the unit. Replacement fuse PN is 550022. To access fuse unscrew fuse cap on the rear of the unit. The "ON/OFF" switch is a DPDT type, PN 520072.

5.2 3KW AC-DC POWER SUPPLY

The 3 KW power supply has an AC input at the rear of the unit and a 28 volt DC output at the rear bus post. The unit is normally considered a module, PN 702109.

5.3 28 VOLT TO 13.8 VOLT DC-DC CONVERTER

The DC-DC Converter, PN 039-01000, consists of two converter modules mounted to a PCB and heatsink. The two modules are run in parallel and each input is protected by a 10 amp fuse PN 550004.

For service refer to Figure 5-4 and Figure 5-5. Table 5-2 and Table 5-3 contain the parts list for the DC-DC converter assemblies.

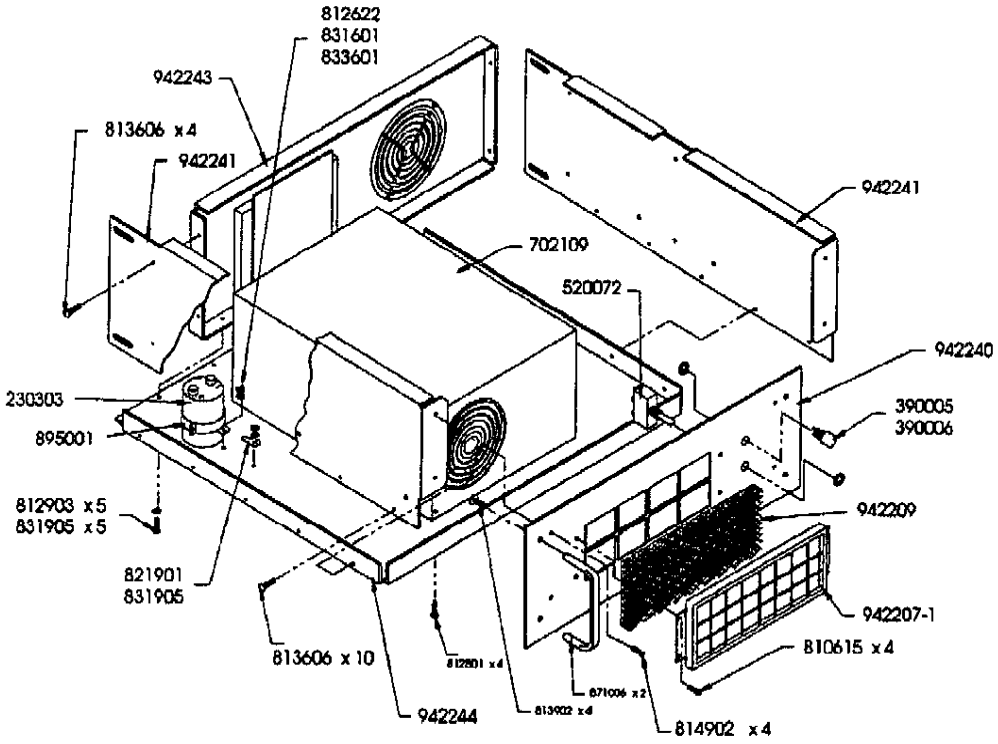

FIGURE 5-1.

PS1000SWA Assembly View.

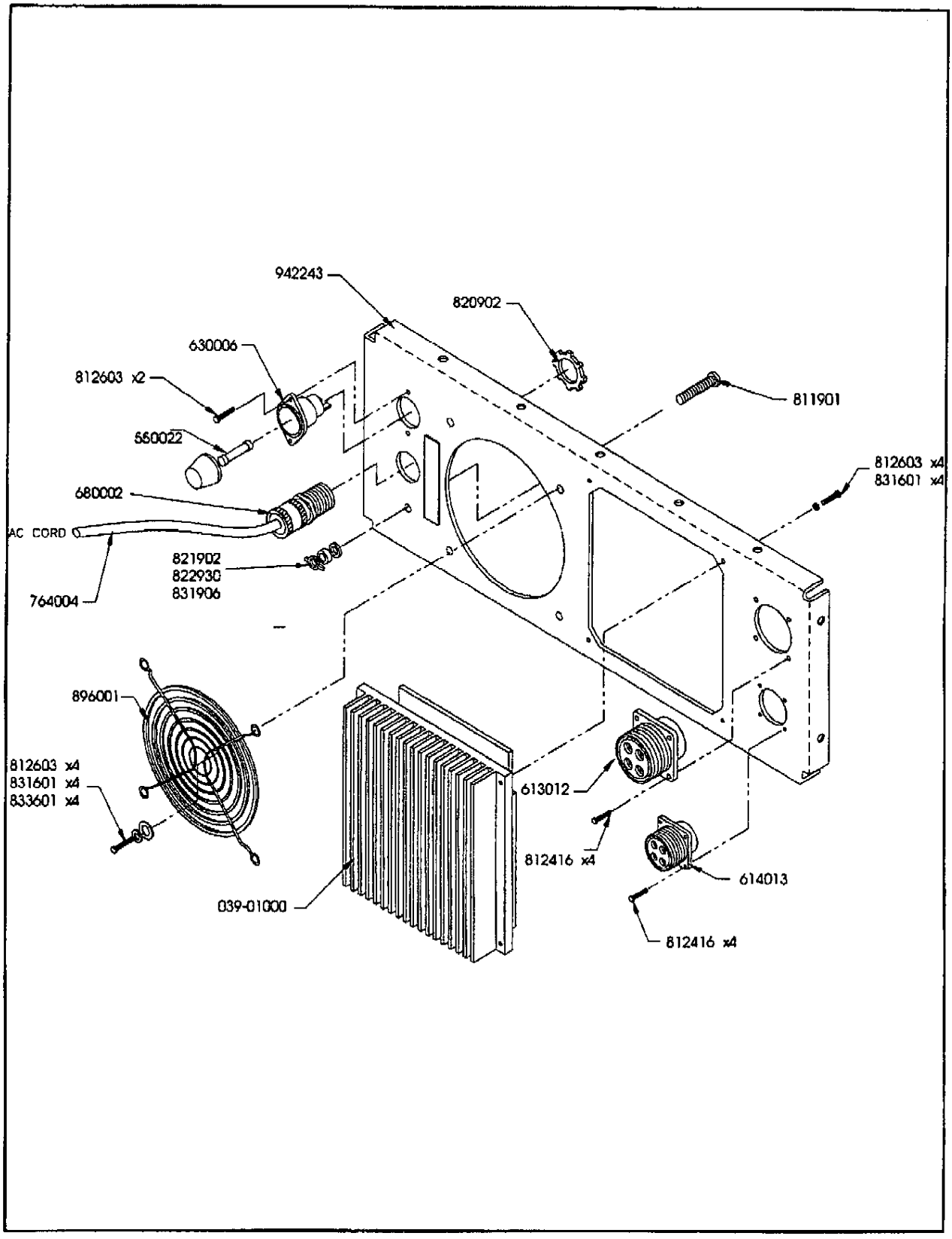

FIGURE 5-2.

PS1000SWA Rear Panel Assembly.

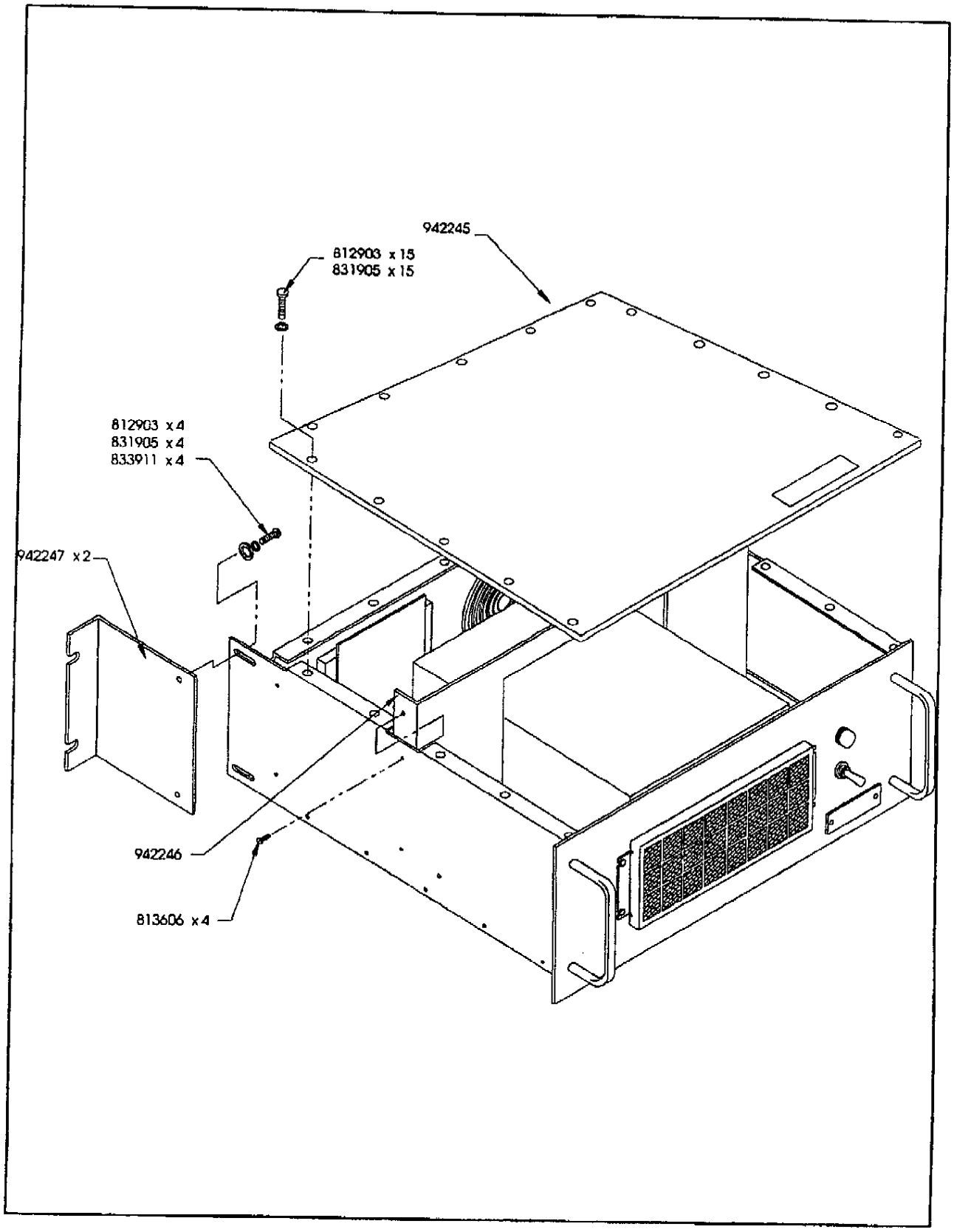

FIGURE 5-3.

PS1000SWA Final Assembly View.

TABLE 5-1.

Parts List, Final Assembly PS1000SWA.

Part Number	Quantity	Description
039-01000	1	Heatsink/ DC-DC (28 to 13.8 V) converter assembly
230303	1	Capacitor, 30,000 μF (C4)
277104	2	Capacitor 0.1 μF (C5,C6)
390005	1	Holder, mini lamp
390006	1	Bulb, mini lamp (red)
490205	3	Bead, ferrite (L1,L2,L3)
520072	1	Toggle switch, DPST 30 amp (S1)
550022	1	Fuse 15 amps 5AB, 250 V (F1)
613012	1	Connector, MIL 4-pin (J1)
613062	1	Connector, AC, NEMA 6-15 Plug
614013	1	Connector, MIL 4-pin (J2)
630006	1	Fuse holder (XF1)
680002	1	AC bushing
702109	1	Power supply HC3011-6, 3 KW/28 V (PS1)
760210	1.5 inches	Gasket, channel
764004	7 Feet	Power cable, 3 conductor 14 AWG
810615	4	Screw 6-32 x 3/8 SS black
811901	1	Screw 1/4-20 x 1 (ground stud)
812416	8	Screw 4-40 x 7/16 black
812603	10	Screw 6-32 x 7/16
812622	3	Screw 6-32 x 3/
812801	4	Screw 8-32 x 3/8
812903	20	Screw 10-32 x 7/16 (top and bottom covers)
813606	14	Screw 6-32 x 7/16
813902	4	Screw 10-32 x 5/8
814902	4	Screw 10-32 x 1/2 black
817901	8	Screw 10-32 x 5/8
819965	4	Bolt 1/4-20 x 1/2
820902	1	Nut, lock drive 1/2 cond type
821901	3	Nut 10-32
821902	6	Nut 1/4-20
822930	1	Wingnut, 1/4-20 (ground stud)
831601	6	Washer #6 split
831801	4	Washer #8 split
831905	29	Washer #10 split
831906	6	Washer 1/4 split
833601	3	Washer #6 flat
833902	4	Washer 1/4 flat
833911	7	Washer #10 flat
871006	2	Handle, black
896001	1	Fan finger guard

TABLE 5-1.

Parts List, Final Assembly PS1000SWA (continued).

Part Number	Quantity	Description
942207-1	1	Filter housing
942209	1	Filter element, PS1000SWA
942240	1	Front panel, PS1000SWA
942241	1	Side panel, left PS1000SWA
942242	1	Side panel, right PS1000SWA
942243	1	Rear panel, PS1000SWA
942244	1	Bottom cover, PS1000SWA
942245	1	Top cover, PS1000SWA
942246	1	Air dam, PS1000SWA
942247	2	Rack mounting ear, PS1000SWA

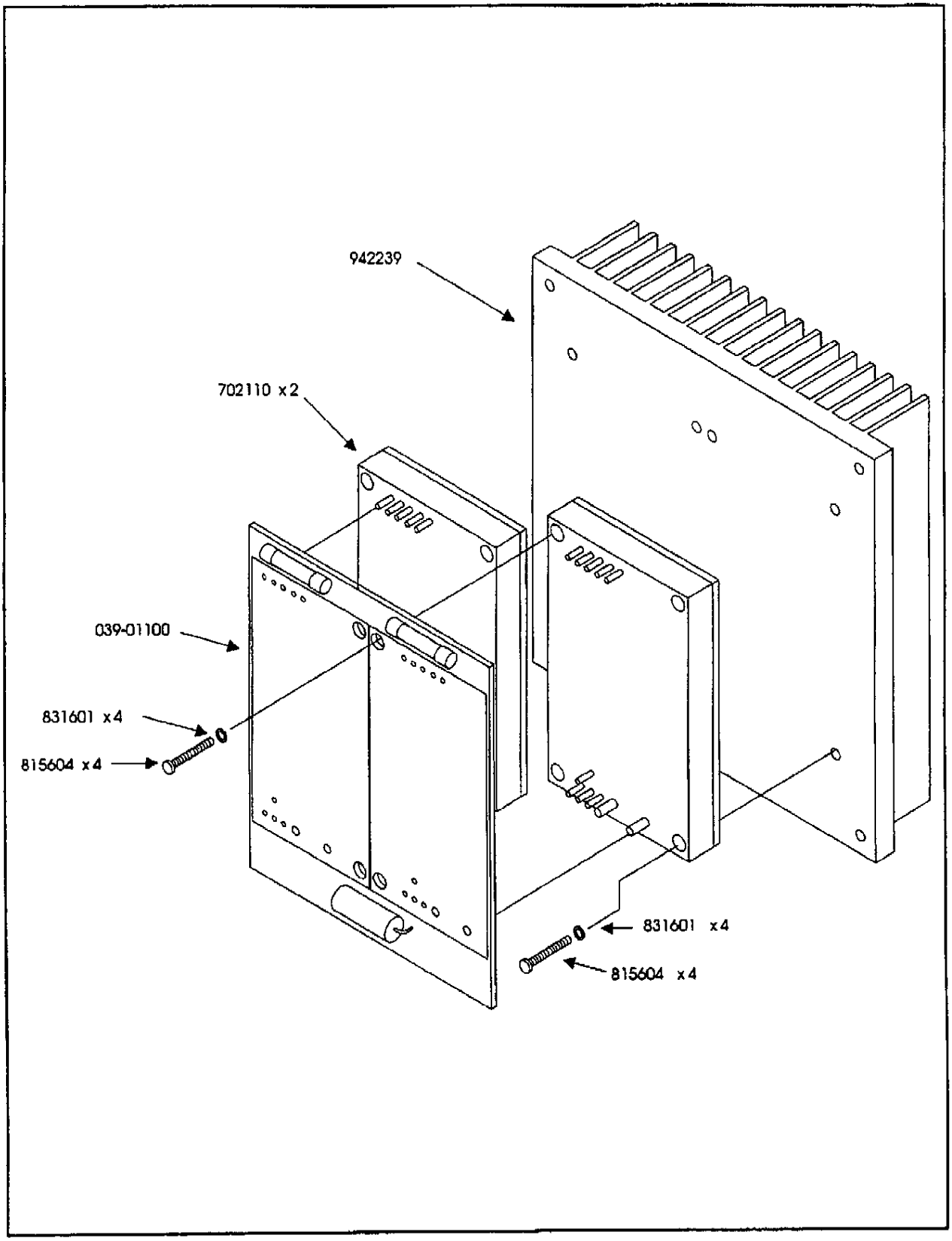

FIGURE 5-4.

DC-DC Converter Assembly (# 039-01000).

TABLE 5-2.

Parts List, Heatsink Assembly DC-DC Converter (039-01000).

Part Number	Quantity	Description
039-01100	1	DC-DC converter PCB assembly
702110	2	DC-DC converter (PS2, PS3)
815604	8	Screw 6-32 x 5/8
831601	8	Washer #6 split
942239	1	Heatsink

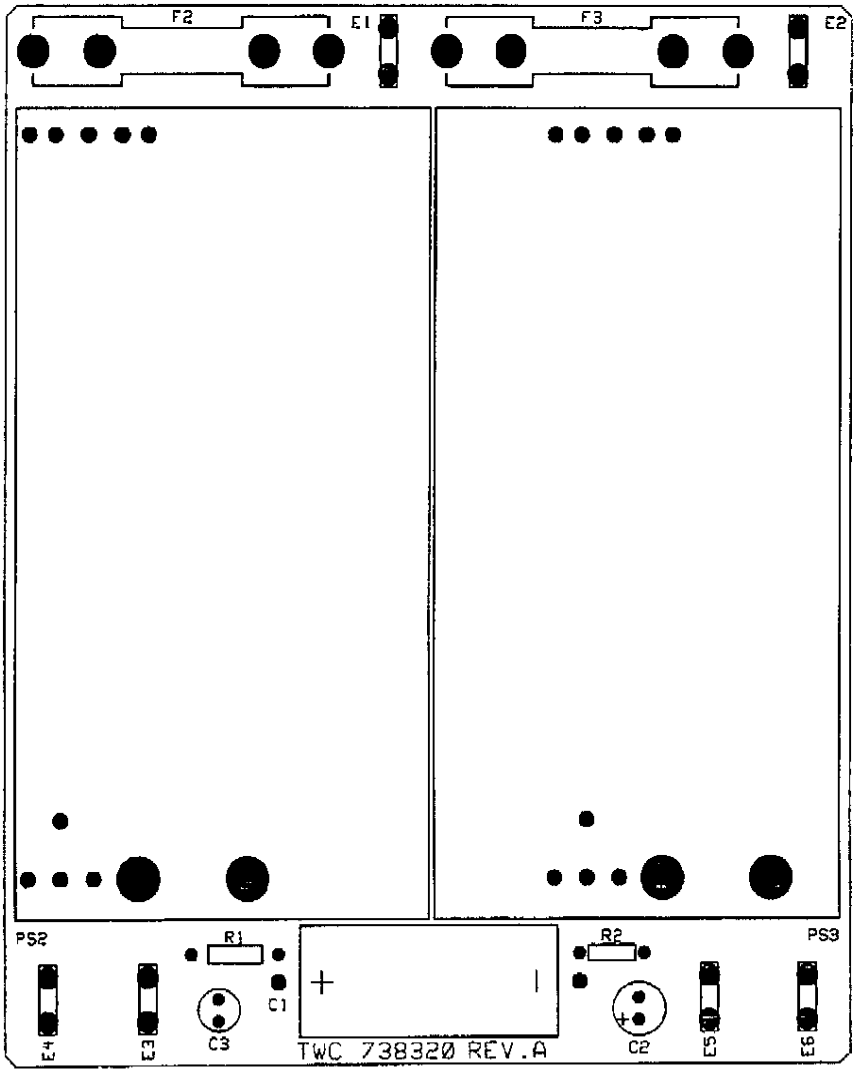

FIGURE 5-5.

PCB Layout DC-DC Converter.

TABLE 5-3.
Parts List, DC-DC Converter Sub-assembly (039-01100).

Designator	Part Number	Description
C1	230102	Capacitor, 1000 μF elect
C2	241100	Capacitor, 10 μF tantalum
C3	275104	Capacitor, 0.1 μF ceramic
E1	860047	Terminal, quick disconnect 0.25, PCB mount
E2	860047	Terminal, quick disconnect 0.25, PCB mount
E3	860047	Terminal, quick disconnect 0.25, PCB mount
E4	860047	Terminal, quick disconnect 0.25, PCB mount
E5	860047	Terminal, quick disconnect 0.25, PCB mount
E6	860047	Terminal, quick disconnect 0.25, PCB mount
F2	550004	Fuse, 10 amp 3AG
F3	550004	Fuse, 10 amp 3AG
R1	124154	Resistor 150 K, 1/4W
R2	124474	Resistor 470 K, 1/4W
	860031	Fuse clip (quantity 4)