PS-28S

Rev-1

USER MANUAL

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Printed in the USA.

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IMSAI

Contents

Functional Description

The PS-28S is a modular, regulated switch-mode power supply for the IMSAI 8080 System. It provides the +8V, +16V, and −16V system voltages and can be supplied with any AC mains voltage from 100 to 240 volts, 50Hz or 60Hz, single phase.

The PS-28S is a switch-mode power supply designed to be a replacement for the PS-28U and its predecessors. The PS-28S comes with the necessary hardware to mount to a universal IMSAI 8080 base plate (most systems produced), or the original mounting hardware may be used. The wiring connections to the output voltages are in the same place as the PS-28. The board length is slightly shorter than the PS-28 to accommodate the newer cabinet rear frame with power entry modules.

A power switch location is provided on the PS-28S for use when a front panel is not installed in the system. There are also switched and unswitched landing pads for connecting auxiliary power outlets on the back panel.

See SPECIFICATIONS for the complete specifications of the PS-28S.

The PS-28S can deliver more power with less voltage variation than the PS-28U. It runs cooler. It is lighter and poses less of a structural risk to the system should it suffer a kinetic event. Since most modern cabinet configurations include a DC fan, a dedicated +12VDC PC fan connector is provided.

The PS-28S is compatible with most system configurations, even though the power up and power down sequencing is a little different. See the THEORY OF OPERATIONS for more information.

Theory of Operations

The PS-28S is a modular, regulated switch-mode power supply that provides the +8V, +16V, and −16V voltages for the IMSAI 8080 System. It uses three commercial power converters to supply each of these three voltages. Each of these converters provides isolation and filtering of the incoming AC power. They also provide current limiting and short circuit protection.

An optional fuse is provided for the input AC line if the input system does not provide one. Two landing pads and an optional switch position are provided for power switching or may be jumpered if an external power switch is provided. One unswitched and two switched power landing pads are provided for powering an optional AC fan, or an optional AC outlet.

Bleeder resistors help to discharge the output power when power is switched off.

A 12-volt DC supply and a standard 4-pin Molex fan connector are provided for installations with a DC fan. A third-party fan controller may also be added between the fan connector and the DC fan.

Power sequencing describes the order in which the three voltages come up to voltage when switched on, and the order in which they drop out of spec when switched off. In previous linear power supplies such as the PS-28U, all three voltages come up within milliseconds of each other. The PS-28U ±16 voltages always power up a few hundred milliseconds before the +8 voltage. This normally does not present a problem in three- supply devices such as the 8080A which normally want their substrate (normally −5V) supply applied first. If the PS-28S applied +8V first, it could possibly stress some three-supply devices. Upon power-down, the PS-28U would typically drop the +8 voltage first, as it would be more heavily loaded. The PS-28S always drops the +8 voltage first.

The circuit layout of the PS-28S provides clearances between line voltage, earth ground, and output voltages according to the SPECIFICATIONS.

There is a "ground binding" pair of pads which can optionally tie the power supply output ground to the PE (Earth ground). This connection was not made in the original IMSAI systems and was common practice in the 1970s. Today, common practice is to tie the grounds together for computer systems. System grounding is one of the many system "religions" (bus termination is another) that sometimes comes down to personal preference. The PS-28S is agnostic and will accommodate either grounding method.

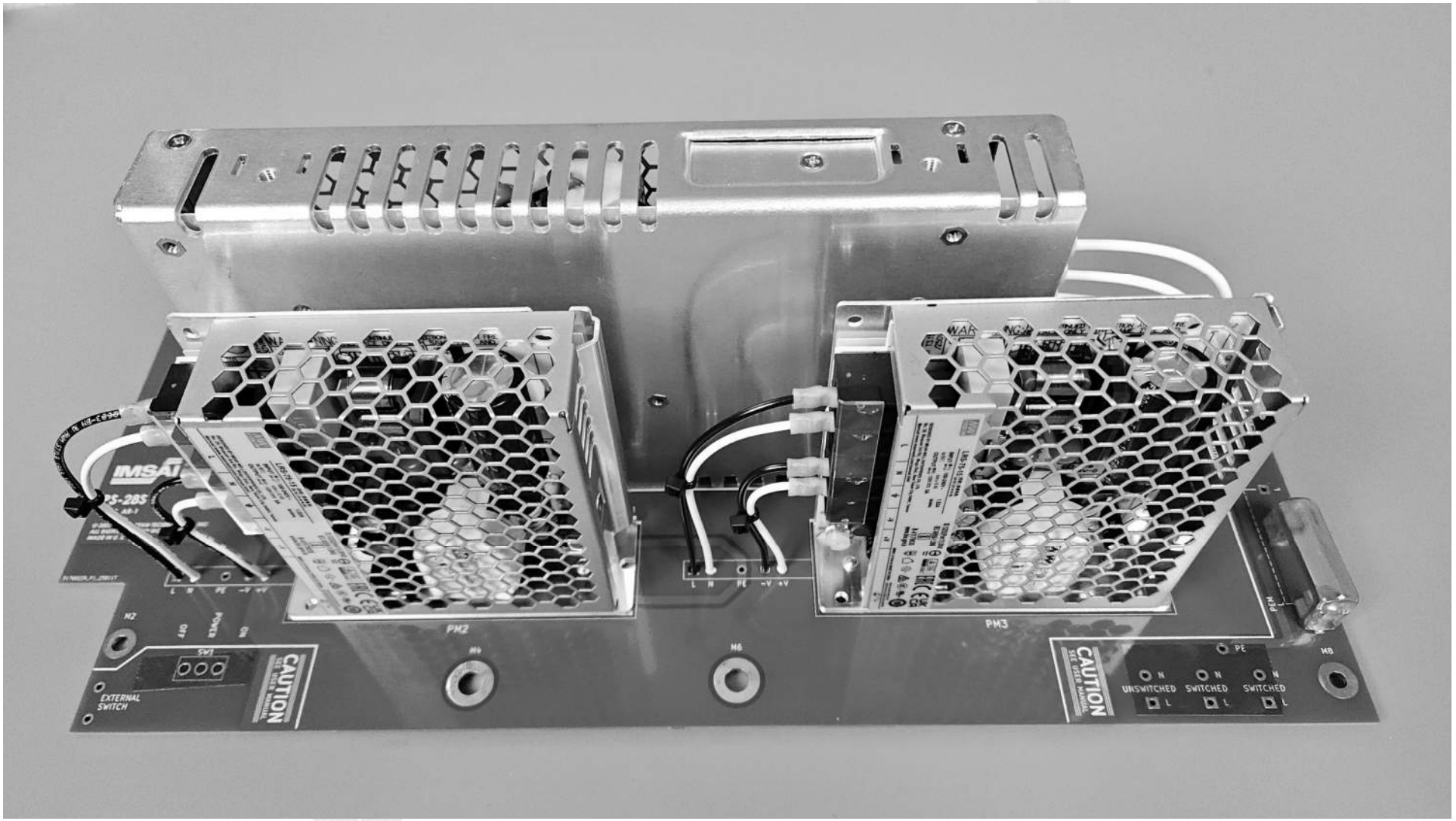


Figure 1. PS-28S

Parts List

Item	Part #	Qty	Description
Fuse Clip	20-00010010	2	PCB 15A ¼" Fuses
Cover	20-00010020	2	Barrier Block Cover, 5 Terminal
Cover	20-00010022	1	Barrier Block Cover, 9 Terminal
Cable Tie	20-00010023	6	4" Black
Cover	20-00010024	1	3AG Fuse Holder Cover
Screw	21-01120105	1	#6-32×$^{5}/_{16}$" Phillips Pan Head Machine
Screw	21-01550106	4	M3×6mm Phillips Pan Head Machine
Screw	21-01560108	2	M4×8mm Phillips Pan Head Machine
Nut	21-10120100	1	#6-32 Hex
Nut	21-10140101	4	#8-32 Hex
Nut	21-10200100	2	¼"-20 Hex
Lock Washer	21-25200100	2	¼" Split
Lock Washer	21-26120100	1	#6 Internal Star
Lock Washer	21-26140100	4	#8 Internal Star
Lock Washer	21-26550100	4	M3 Internal Star
Lock Washer	21-26560100	2	M4 Internal Star
Standoff	21-36145008	4	Round #8-32×¼×½" Nylon
Standoff	21-36205008	2	Round or Hex ¼-20×½×½" Nylon
Screw	21-74140120	4	#8-32×1¼" Slotted Binding Head Machine
Screw	21-74200124	2	¼"-20×1½" Slotted Binding Head Machine
Connector	24-50000400	1	Molex 4-pin Fan Header
Heat Sink	28-00000001	1	Thermalloy/5106B-14
Resistor	30-10032106	2	1kΩ, ½ Watt, brown/black/red
Resistor	30-47022106	1	470Ω, ½ Watt, yellow/violet/brown
Capacitor	32-10062025	1	0.1µF Axial Ceramic
Capacitor	32-22012540	1	2.2µF Tantalum
7812	38-00781241	1	12V Positive Volt Regulator
Fuse	52-25020001	1	3AG Slow Blow 2.5A, 250VAC
Fuse	52-50020001	1	3AG Slow Blow 5A, 250VAC
Power Module	75-24000000	1	Mean Well RSP-200-7.5 Switching Power Supply
Power Module	75-24000001	2	Mean Well LRS-75-15 Switching Power Supply

Item	Part #	Qty	Description
PC Board	92-20000210	1	PS-28S, Rev. 1
Cable Assembly	92-80001300	2	CABLE CA Assembly, Connects LRS-75 to PCB
Cable Assembly	92-80001400	1	CABLE CB Assembly, Connects RSP-200 to PCB
Manual	98-15000410	1	IMSAI PS-28S User Manual

Assembly Instructions

Before you begin, clear your workspace, and try to minimize distractions for the next couple of hours.

The PS-28S board comes with insulating Kapton tape over solder pads that may be unused and carry potentially dangerous mains voltage:

- The F1 fuse clips
- The one unswitched and two switched service pads
- The SW1 power switch pads

Some assembly instructions may call for removal of this tape to access the pads. At the end of assembly and before being put into service, be sure that the unused pads are covered for your protection.

☐ Unpack your board and check all parts against the parts lists enclosed in the package.

Tools

In addition to the usual electronics soldering and rework tools, you will need the following:

- $^{11}/_{32}$ inch and $^{7}/_{16}$ inch hex nut drivers.
- #1 and #2 Philips head screwdrivers.
- ¼-inch (6.5 mm) and ⅜-inch (if available) slotted screwdrivers.
- 2.4mm jeweler's screwdriver.
- Needle nose plier.
- Flush-cutting wire cutters.
- Small hand wire stripper with 14 AWG and 18 AWG wire capacity. Large hand-held strippers are not recommended for this job.
- Temperature controlled soldering station.
- Solder wire of your choice.
    - 37/63 (leaded) solder wire is usually easiest to work with but may not be available in your area. Most solder wire used for rework should be fine.
    - Rosin or no-clean fluxes are recommended, water-clean and others are not recommended. Rosin flux should be cleaned off the board when the assembly is complete using Isopropyl alcohol (IPA) at 90% or better concentration.

The following items are recommended for the most professional looking results:

- Solder sucker and/or wick to aid in correcting soldering mistakes.
- Component lead-forming jig for professional-looking results.

Cabinet Mounting Considerations

If you are installing the PS-28S into a system without an IMSAI universal base plate, an older IMSAI, or a 1980s cabinet from Fischer-Freitas Corp., you will need to drill mounting holes in the cabinet to receive the mounting hardware that came with the PS-28S kit. The best way to do this is to place the bare board onto the cabinet base where you intend to mount it and trace the M1, M2, M3, M4, M7 and M8 holes. The recommended hole size for M1, M2, M7, and M8 is $^{7}/_{32}$-inch (5.6mm), and $^{9}/_{32}$-inch (7.1mm) for M3 and M4.

Option Jumper Installation

As discussed in the THEORY OF OPERATIONS, the GROUND BINDING pads should be jumpered with a short piece of wire or leftover resistor lead if you wish to connect the power supply GROUND terminals to earth ground.

Small Discrete Component Installation

- ☐ Insert and solder the one 0.1µF capacitor at position C2.
- ☐ Insert and solder each of the two 1K ohm ½ watt resistors (brown/black/red) at positions R1 and R2.
- ☐ Insert and solder the one 470-ohm ½ watt resistor (yellow/violet/brown) at position R3.

Large Discrete Component Installation

- ☐ Insert and solder the one 2.2 µF tantalum capacitor at location C1. NOTE: Observe polarity as marked on board.
- ☐ Insert and solder the one Molex fan connector at location J1.
- ☐ If you are providing your own mains fuse before the PS-28S, or are using a fused power entry module, you should skip this step. Otherwise, remove the Kapton tape over F1. Orient the clips so the crimped ends of the fuse barrel do not face each other. See FIGURE 2. Insert and solder each of the two fuse clips at location F1.

Regulator and Heat Sink

- ☐ To install the one regulator and heat sink, first bend the 7812 regulator leads at 90° angles to a length which allows their insertion into the hole pattern of the PS-28S board as shown in Assembly Diagram. Then, insert a #6 screw through the solder side of the board and place the heat sink, 7812 regulator, lock washer, and nut on the heat sink component side of the board around the screw. Tighten the nut and screw carefully to ensure proper alignment of the heat sink to prevent shorting to adjacent traces.

Power Module Installation

The power modules connect to the board through "pigtails," which are wires terminated on one end with a ring terminal. This is the most difficult part of assembling the kit. Dressing the pigtails is not only important for good appearance, but also because of the high voltages it must endure. Although the operating voltages are below 250 volts, parts of the circuitry must be able to withstand two or three thousand volts of isolation. Therefore, it is important to make sure that the soldered

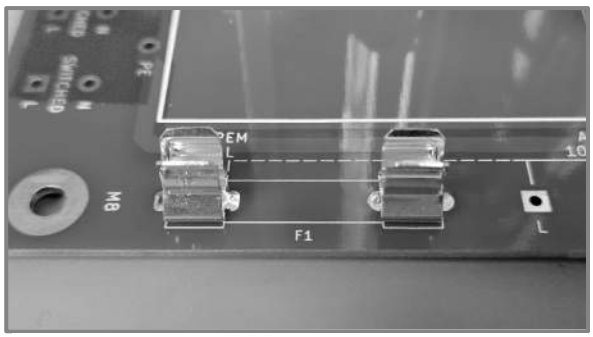


Figure 2. Fuse Clip Installation

connections between the wire and the board do not contain sharp edges. While it is a good idea to try to accomplish this during the initial assembly, it's also a good idea to check the joints over again when that section is complete. Any edges found may be corrected by trimming with the flush cutters, or with careful grinding with a Dremel tool.

While this may seem excessive, it just might help your system survive a surge or lightning strike!

PM1 and PM3 Mounting

- ☐ Position one of the two LRS-75-15 power converters at location PM3 with the barrier block oriented toward the row of pads and the white stripe on the silkscreen matching up with the solid aluminum side of the power module. Turn the power converter over onto its opposite long side.
- ☐ Turn the board over (solder side up) and identify the power module mounting holes in the board from the bottom side.
- ☐ Insert an M3 lock washer onto an M3 machine screw and insert through the mounting hole in the bottom of the board and into the power module using a #1 Philips head screwdriver. Do not tighten. The board may want to fall over on its side during this operation.
- ☐ Repeat the above step for the second mounting hole.
- ☐ Tighten both machine screws, but do not overtighten. You can easily strip out the threaded receiver holes in the power module. You just need to ensure a stable solid mechanical and electrical connection.
- ☐ Position the one RSP-200-7.5 power converter at location PM1 with the barrier block oriented toward the row of pads and the white stripe on the silkscreen matching up with the solid aluminum side of the power module. Turn the power converter over onto its opposite long side.
- ☐ Turn the board over (solder side up) and identify the power module mounting holes in the board from the bottom side.
- ☐ Insert an M4 lock washer onto an M4 machine screw and insert through the mounting hole in the bottom of the board and into the power module using a #2 Philips head screwdriver. Do not tighten.
- ☐ Repeat the above step for the second mounting hole.
- ☐ Tighten both machine screws but do not overtighten. You can easily strip out the threaded receiver holes in the power module. You just need to ensure a stable solid mechanical and electrical connection.

PM1 Wiring

- ☐ Place the board flat on its solder side and rotate the power module PM1 towards you. The barrier block should be on your left.

- ☐ Remove the screws from the PM1 barrier block except the ⏚ terminal and set aside. There should be eight screws.
- ☐ Separate the one black cable with the red terminal insulator from the one CABLE CB. Measure 2¼inches (57 mm) from the terminal insulator and cut the black wire. Using the small hand strippers, strip ⅛ inch (3 mm) from the end.
- ☐ Insert the stripped end of the wire into the board's pad **L**. Turn the ring terminal as necessary so it is in the proper rotational orientation for mating to the barrier block. Solder the wire from the back side of the board making sure that all the wire strands go through the hole to the back side of the board.
- ☐ Guide the ring terminal end in a ¾ (270°) circle into the PM1 barrier block terminal **L**. Loop the wire away from the board and insert into the board's pad **L**. The wire should make a 270° angle from the barrier block to the board. See FIGURE 3 for reference. Screw the ring terminal to the PM1 barrier block terminal **L**. Bend the terminal slightly to allow the loop to flare away from the straight vertical portion of the wire which is soldered into the board.
- ☐ Separate the one white cable with the red terminal insulator from the one CABLE CB. Measure $2^5/_8$ inches (67 mm) from the terminal insulator and cut the white wire. Using the small hand strippers, strip ⅛ inch (3 mm) from the end.
- ☐ Insert the stripped end of the wire into the board's pad **N**. Turn the ring terminal as necessary so it is in the proper rotational orientation for mating to the barrier block. Solder the wire from the back side of the board.
- ☐ Guide the ring terminal end in a ¾ circle into the PM1 barrier block terminal **N**. Loop the wire away from the board and insert into the board's pad **N**. The wire should make a 270° angle from the barrier block to the board. See FIGURE 3 for reference. Screw the ring terminal to the PM1 barrier block terminal **N**. Bend the terminal slightly to allow the loop to flare away from the straight vertical portion of the wire which is soldered into the board.
- ☐ Separate the three black cables with the blue terminal insulator from the one CABLE CB. Cut the wires to the following lengths as measured from the terminal insulator: $2^3/_8$, $2^7/_8$, and $3^3/_8$ inches (60, 73, and 86 mm). Using the small hand strippers, strip ⅛ inch (3 mm) from each end.
- ☐ Screw the cable terminals to the three PM1 barrier block terminals **−V** with the shorter cables closest to the board. Insert the wires into the board's **−V** pads and solder the wires from the back side of the board.
- ☐ Cut the remaining CABLE CB white wires to the following lengths as measured from the terminal insulator: $3^7/_8$, $4^3/_8$, and $4^7/_8$ inches (98, 111, and 124 mm). Using the small hand strippers, strip ⅛ inch (3 mm) from each end.
- ☐ Screw the cable terminals to the three PM1 barrier block terminals **+V** with the

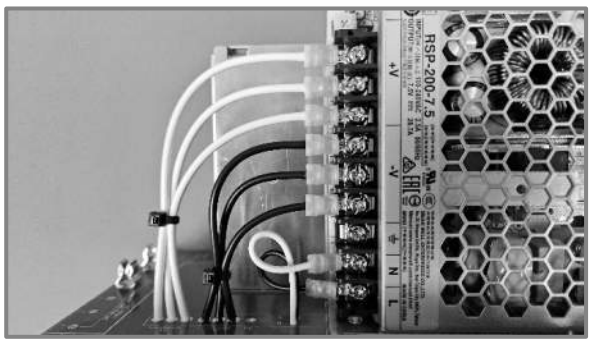


Figure 3. PM1 RSP-200-7.5 Wiring

shorter cables closest to the board. Insert the wires into the board's **+V** pads and solder the wires from the back side of the board.

☐ Take one of the cable ties and tie the three +V white wires together, and another cable tie to tie the three −V black wires together. FIGURE 3 illustrates how the wiring should look. Note that the ⏚ terminal and the PE board pad are not used.

PM3 Wiring

☐ Place the board flat on its solder side and rotate the power module PM3 towards you. The barrier block should be on your left.

☐ Remove the screws from the PM3 barrier block except the ⏚ terminal and set aside. There should be four screws.

☐ Separate one white cable from one the two CABLE CA. Measure $2^{1}/_{8}$ inches 54 mm) from the terminal insulator and cut the white wire. Using the small hand strippers, strip ⅛ inch (3 mm) from the end.

☐ Screw the cable terminal to the PM3 barrier block terminal **+V** and insert the wire into the board's **+V** pad and solder the wire from the back side of the board.

☐ Separate one black cable from the same CABLE CA. Measure 2½ inches (64 mm) from the terminal insulator and cut the black wire. Using the small hand strippers, strip ⅛ inch (3 mm) from the end.

☐ Screw the cable terminal to the PM3 barrier block terminal **−V**. Insert the wire into the board's **−V** pad and solder the wire from the back side of the board. Use one of the supplied wire ties to bundle the two wires together for a neat appearance. See FIGURE 4 for reference.

☐ Separate the other white cable from the same CABLE CA. Measure 3½ inches 89 mm) from the terminal insulator and cut the black wire. Using the small hand strippers, strip ⅛ inch (3 mm) from the end.

☐ Screw the cable terminal to the PM3 barrier block terminal **N**. Insert the wire into the board's **N** pad and solder the wire from the back side of the board.

☐ Cut the remaining CABLE CA black wire $3^{7}/_{8}$ inches (98 mm) from the terminal insulator and cut the white wire. Using the small hand strippers, strip ⅛ inch (3 mm) from the end.

☐ Screw the cable terminal to the PM3 barrier block terminal **L**. Insert the wire into the board's **L** pad and solder the wire from the back side of the board. Use one of the supplied wire ties to bundle the two wires together for a neat appearance. FIGURE 4 illustrates how the wiring should look. Note that the ⏚ terminal and the PE board pad are not used.

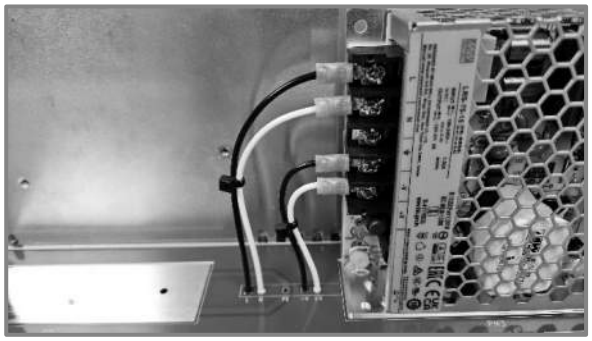


Figure 4. PM3 LRS-75-15 Wiring

PM2 Mounting

- ☐ Turn the board over on its side and identify the power module mounting holes in the board from the bottom side.
- ☐ Position the remaining LRS-75-15 power converter at location PM2 with the barrier block oriented toward the row of pads and the white stripe on the silkscreen matching up with the solid aluminum side of the power module.
- ☐ Insert an M3 lock washer onto an M3 machine screw and insert through the mounting hole in the bottom of the board and into the power module using a #1 Philips head screwdriver. The board will want to fall over on its side during this operation. Do not tighten.
- ☐ Repeat the above step for the second mounting hole.
- ☐ Tighten both machine screws, but do not overtighten. You can easily strip out the threaded receiver holes in the power module. You just need to ensure a stable solid electrical connection.

PM2 Wiring

- ☐ Place the board flat on its solder side and rotate the power module PM2 towards you. The barrier block should be on your left.
- ☐ Remove the screws from the PM2 barrier block except the ⏚ terminal and set aside. There should be four screws.
- ☐ Separate one white cable from the remaining CABLE CA. Measure $2^1/_8$ inches 54 mm) from the terminal insulator and cut the white wire. Using the small hand strippers, strip ⅛ inch (3 mm) from the end.
- ☐ Screw the cable terminal to the PM2 barrier block terminal **+V** and insert the wire into the board's **+V** pad and solder the wire from the back side of the board.
- ☐ Separate one black cable from the CABLE CA. Measure 2½ inches (64 mm) from the terminal insulator and cut the black wire. Using the small hand strippers, strip ⅛ inch (3 mm) from the end.
- ☐ Screw the cable terminal to the PM2 barrier block terminal **−V**. Insert the wire into the board's **−V** pad and solder the wire from the back side of the board. Use one of the supplied wire ties to bundle the two wires together for a neat appearance. See FIGURE 5 for reference.
- ☐ Separate the other white cable from the CABLE CA. Measure $3^1/_2$ inches 89 mm) from the terminal insulator and cut the black wire. Using the small hand strippers, strip ⅛ inch (3 mm) from the end.

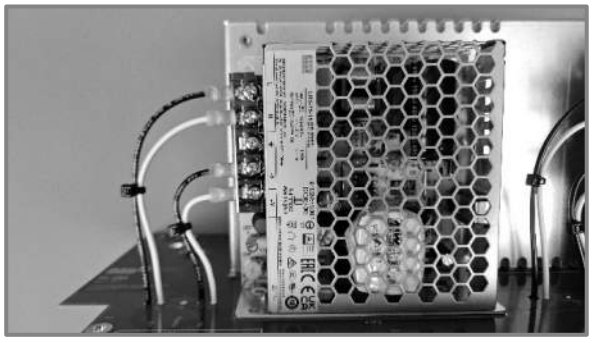


Figure 5. PM2 LRS-75-15 Wiring

☐ Screw the cable terminal to the PM2 barrier block terminal **N**. Insert the wire into the board's **N** pad and solder the wire from the back side of the board.

☐ Cut the remaining CABLE CA black wire $3^{7}/_{8}$ inches (98 mm) from the terminal insulator and cut the white wire. Using the small hand strippers, strip ⅛ inch (3 mm) from the end.

☐ Screw the cable terminal to the PM2 barrier block terminal **L**. Insert the wire into the board's **L** pad and solder the wire from the back side of the board. Use one of the supplied wire ties to bundle the two wires together for a neat appearance. FIGURE 5 illustrates how the wiring should look. Note that the ⏚ terminal and the PE board pad are not used.

Fuse Insertion

☐ If fuse clips are present at F1 and the mains power is 200V or higher, insert the one 2.5A fuse into the clips.

☐ If fuse clips are present at F1 and the mains power is less than 200V, insert the one 5A fuse into the clips.

Final Inspection

☐ Inspect the finished board for missed solder connection, cold joints, and solder bridges.

☐ Using a continuity tester or ohmmeter, check for shorts between the PE and N, PE and L, and L and N pads on the mains inputs (substitute the PEM L pad for the L pad if there is no fuse at F1).

☐ Snap on the one 9-pin barrier block cover over the PM1 barrier block.

☐ Snap on each of the two 5-pin barrier block cover over the PM2 and PM3 barrier blocks.

☐ Place the translucent fuse cover over F1.

Mounting in a Cabinet

Now that the PS-28S assembly is complete, it's time to install it in a cabinet.

The PS-28S board has several sets of pads to connect to the AC mains, the DC to the back-plane, AC power switching, and AC to auxiliary services like fans and outlets. The wires into these pads may be soldered from the solder side if they are installed before the PS-28 is mounted into the cabinet. Otherwise, they may be soldered from the component (top) side. The assembly order suggested here installs wiring that is usually available before the PS-28S is installed in the cabinet.

Power Switching

Before mounting in the cabinet, you should consider how the power is to be switched in the system. The power switch may be:

- In the power entry module, if it is switched and/or fused.
- In a builder-supplied toggle switch secured to one of the ¼" holes in the cabinet back frame near the fan.
- On a front panel which supports mains power switching.
- On the PS-28S itself.

If the system contains a front panel with a mains power switch, simply follow the wiring instructions in the front panel's User Manual to connect the power switch across the PS-28S EXTERNAL SWITCH pads.

You may also install your own power switch directly on the PS-28S. This may be handy if the system is meant to be run without a cover. A service technician's system would be an example. Make certain that the switch is rated for 125VAC at 5 amperes (250VAC at 2½ amperes) or more. Remove the Kapton tape over the SW1 pads and solder in the switch.

If you plan to run the system unswitched or use a back panel mounted switch or power entry module, solder a short piece of insulated #18 stranded wire across the PS-28S EXTERNAL SWITCH pads.

Mains Power Connection

The mains power normally comes in from a power cord or power entry module (PEM) on the cabinet's back frame. In the case of a power cord or a simple un-fused PEM, the black, white, and green wires are soldered directly to the L, N, and PE pads respectively on the PS-28S. This requires the installation of the fuse clips when assembling the board. Optionally, a switch may be wired between the power cord and the PS-28S.

If a fused PEM or a builder-supplied inline fuse is used with a power cord or other PEM, the PS-28S fuse clips are not used, and the line wire from the PEM is soldered to the PEM L pad in place of one of the fuse clips.

Connecting to a Switched Outlet

Some cabinet rear frames with PEMs have an outlet that can be wired to be always on or switched. To wire it as switched, remove the Kapton take from one set of SWITCHED outlet

pads. Make sure the PE terminal on the outlet is connected to the PEM PE terminal. Then wire the outlet's line terminal to the exposed square pad (marked L) and the neutral terminal to the exposed round pad (marked N).

Mounting in the Cabinet

The PS-28S is designed to mount in an IMSAI 8080 cabinet with a universal base plate. FIGURE 6 shows the power supply mounting holes used in the original PS-C (PS-28 family) predecessors and the PS-28S. FIGURE 6 is a top view. Some mounting holes are for the predecessors only (marked as PS-C). Some are for the PS-28S only (marked as PS-28S in italics). Some are for both or optional for the PS-28S.

New System Install

If you are installing the PS-28S into a new system, use the supplied hardware in the mounting holes marked in FIGURE 6 as PS-28S (in italics), excluding the two optional holes.

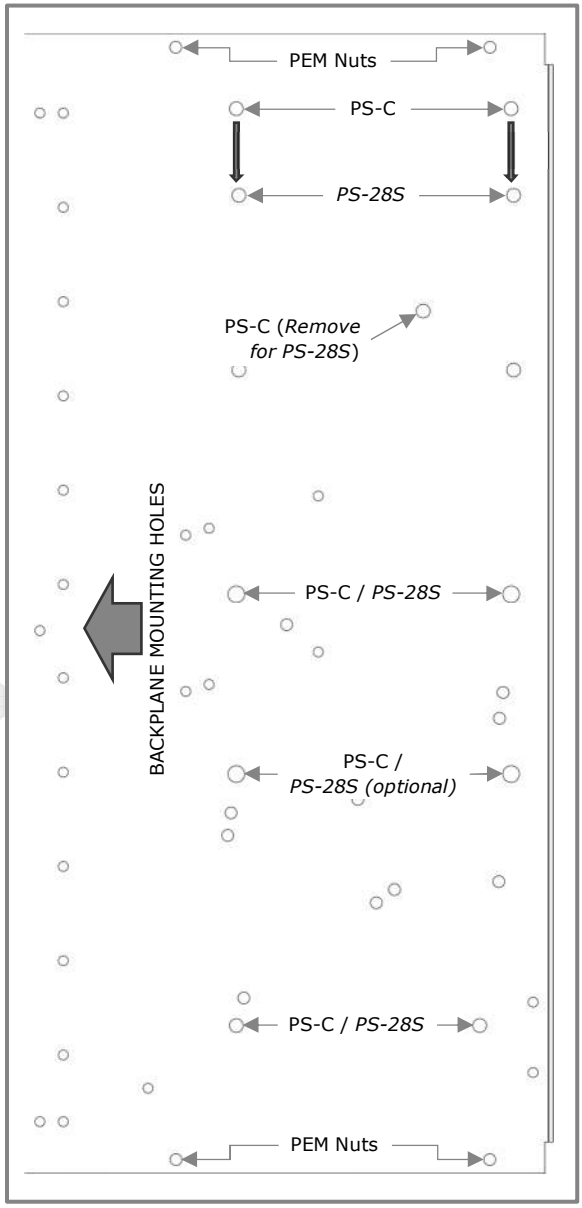


Figure 6. IMSAI 8080 Cabinet Power Supply Mounting Arrangement

- ☐ Begin by turning the cabinet on its side with the power supply bay above the backplane bay.
- ☐ Insert the two ¼"-20×1½" machine screws through the middle base plate holes marked "PS-28S" and secure with the two threaded nylon standoffs. Do not tighten at this point but leave them where they can move a little.
- ☐ Insert the four #8-32×1¼" machine screws through the base plate holes marked "PS-28S" and secure with the two threaded nylon standoffs. Do not tighten at this point but leave them where they can move a little.
- ☐ Turn the cabinet over on its feet and carefully position the PS-28 over its mounting screws. It may be something of a tight fit as the positioning of the machine screws will probably have to move around a bit.
- ☐ Place the two ¼" lock washers over the two middle machine screws, followed by the two ¼" hex nuts. Hand-tighten the nuts for now.

- ☐ Return the cabinet to its side again to access the six machine screws. Tighten each of the six machine screws with a flat bladed screwdriver. If the screws do not readily catch in the threaded standoffs, apply a little pressure on the screw or the PS-28S board from the inside of the cabinet. The idea is to secure the screws into positions that will allow the PS-28S board to mount securely.
- ☐ Tighten the two ¼" hex nuts to the ¼" machine screws.
- ☐ Insert the four #8 lock washers and hex nuts over the remaining machine screws and tighten.

PS-C Replacement

If you are replacing an existing PS-C power supply, begin by unsoldering the existing connecting wiring. You do not need to unsolder any wiring that is internal to the PS-C. Remove the existing nuts and lock washers from the two transformer legs nearest the side of the cabinet and the three #8-32×1¼" screws nearest the side of the cabinet.

Turn the entire system on its right side with the weight of the power supply nearest the work surface. Remove the existing nuts and lock washers. While supporting the weight of the transformer, begin slowly moving the assembly away from the base plate. The screws at the front and back of the power supply board are slightly shorter than the transformer screws. Once the board clears these screws, the entire assembly can be removed and set on its side. Remove the old PS-C from the work area.

From here, the simplest thing to do is to reuse the old power supply mounting hardware. Remove the two #8-32×1¼" screws from their ½" nylon standoffs and install them in the adjacent holes as shown in FIGURE 6 by the down arrows. Remove the one #8-32×1¼" screw from its ½" nylon standoff (marked as "Remove for PS-28S"). Now the base plate is ready to receive your new PS-28S when it is completed.

Some original PS-C installations used flat nylon or steel washers between the PCB and the lock washers. The PS-28S is designed to mate directly to the lock washer. Do not reinstall the washers if you are using the old hardware.

Connecting a DC Fan

DC fans are now preferred over AC fans due to lower cost, independence from the mains voltage and frequency, and having the ability to use a fan controller. Connecting to a DC case fan is simple, just plug in the fan's connector to J1. It will work with 2, 3, or 4 pin fans. You may install a fan controller between J1 and the fan if desired.

Connecting an AC Fan

Older systems ran on an AC fan that was connected to either one of the switched outlet pads or the 115V transformer tap. This allowed the use of a 115VAC fan to be used even with 220V mains.

Because the PS-28S doesn't have an accessible mains transformer, there is no 115VAC power available for systems running on 230V. If this describes your system, you have two choices – use a 230V fan or convert to a DC fan.

To connect to an AC fan, remove the Kapton tape from one set of SWITCHED outlet pads, and solder the connecting wiring cables from the fan.

Connecting to the Backplane

The EXP-22 is a common backplane to pair with the PS-28S. The EXP-22 comes with hookup wire for connecting to a PS-28. Follow the directions in the EXP-22 User Manual.

For all backplanes, solder the wires from the backplane through the solder side of the PS-28S GROUND, +8V, +16V, and −16V pads and solder from the component side.

Checkout

Before proceeding, make sure that there are no S-100 boards plugged into the backplane, including the front panel. Also, make sure that there is no mains power to the cabinet.

Using an ohmmeter, check for shorts in the power wiring. Because the power supply is now in the circuit, you may get a "short" indication briefly. You may also get a persistent resistance reading of 50 ohms or so. This is normal, if the resistance reading is not steady at a couple of ohms or less.

If the PS-28S is wired for a front panel power switch you will need to safely bypass it to test the power supply. The PS-28S EXTERNAL SWITCH wires should not be soldered to the front panel power switch yet. If they are, unsolder them from the front panel, solder the wires together, and wrap the joint with electrical tape. If the wire ends have not been soldered, strip the ends and join them with a wire nut. If you do not have a wire nut, strip and solder the wires together, and wrap the joint with electrical tape. With the power switch now bypassed, the power supply will energize as soon as you plug it into the mains power.

With the mains power applied, connect the – lead of a DC voltmeter to one of the backplane edge connector pin 50. Check the voltage at pin 1, being careful not to short to the adjacent pin 2. It should read roughly 7.5 volts. If it is less than 7.25 volts or greater than 9 volts, follow the voltage adjustment procedure in the USER GUIDE. Check pin 2 is +15 volts, and pin 52 (across from pin 2) is −15V. If either voltage is less than 14.5 volts or greater than 18 volts, follow the voltage adjustment procedure in the USER GUIDE.

Unplug or switch off the power to the cabinet. Your power supply is now checked out ready for boards to be plugged into the backplane. If you made any modifications to the front panel for the checkout testing, restore it to its normal state.

Install the front panel first, as it is usually necessary to be able to turn the system on and off.

User Guide

Before inserting the front panel board or any S-100 boards into the backplane, you should check and adjust the voltages. The power converters come from the factory set to 7.5 and ±15 volts. Depending on your system and your personal preferences, you may choose to leave these voltages where they are. Most S-100 systems will run just fine with these voltages. The following paragraph discusses how to change them to the IEEE 696 standard +8 and ±16 volts if you desire.

Figure 7. RSP-200-7.5 Voltage Adjustment Pot

To adjust the power module voltage, you will need the 2.4mm jeweler's screwdriver.

Switch on the power and connect a DC voltmeter between GROUND and +8V on the PS-28S. It should display approximately 7.5 volts. Locate the adjustment pot on PM1 near the barrier block. See FIGURE 7. Turn it until it displays +8.0 volts. Move the voltmeter probe from the +8V pad to the −16V pad. It should display approximately −15 volts. Locate the adjustment pot on PM2 near the barrier block. See FIGURE 8. Turn it until it displays −16.0 volts. Move the voltmeter probe from the −16V pad to the +16V pad. It should display approximately 15 volts. Locate the adjustment pot on PM3, near the barrier block. See FIGURE 8. Turn it until it displays 16.0 volts.

Move the voltmeter probes to pins 1 (−) and 2 (+) of the DC fan connector J1. It should display approximately 12 volts. There is no adjustment for the fan power.

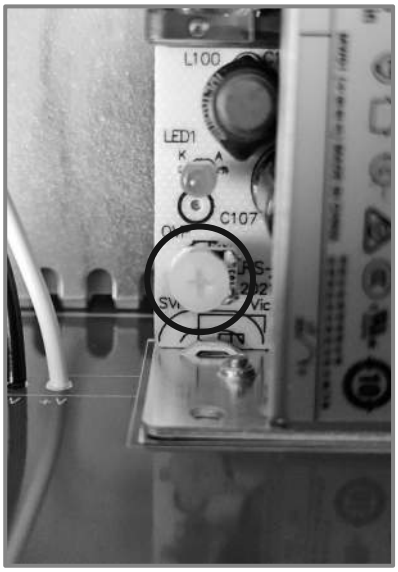


Figure 8. LRS-75-15 Voltage Adjustment Pot

Specifications

All specifications are at 77°F (25°C) unless otherwise noted.

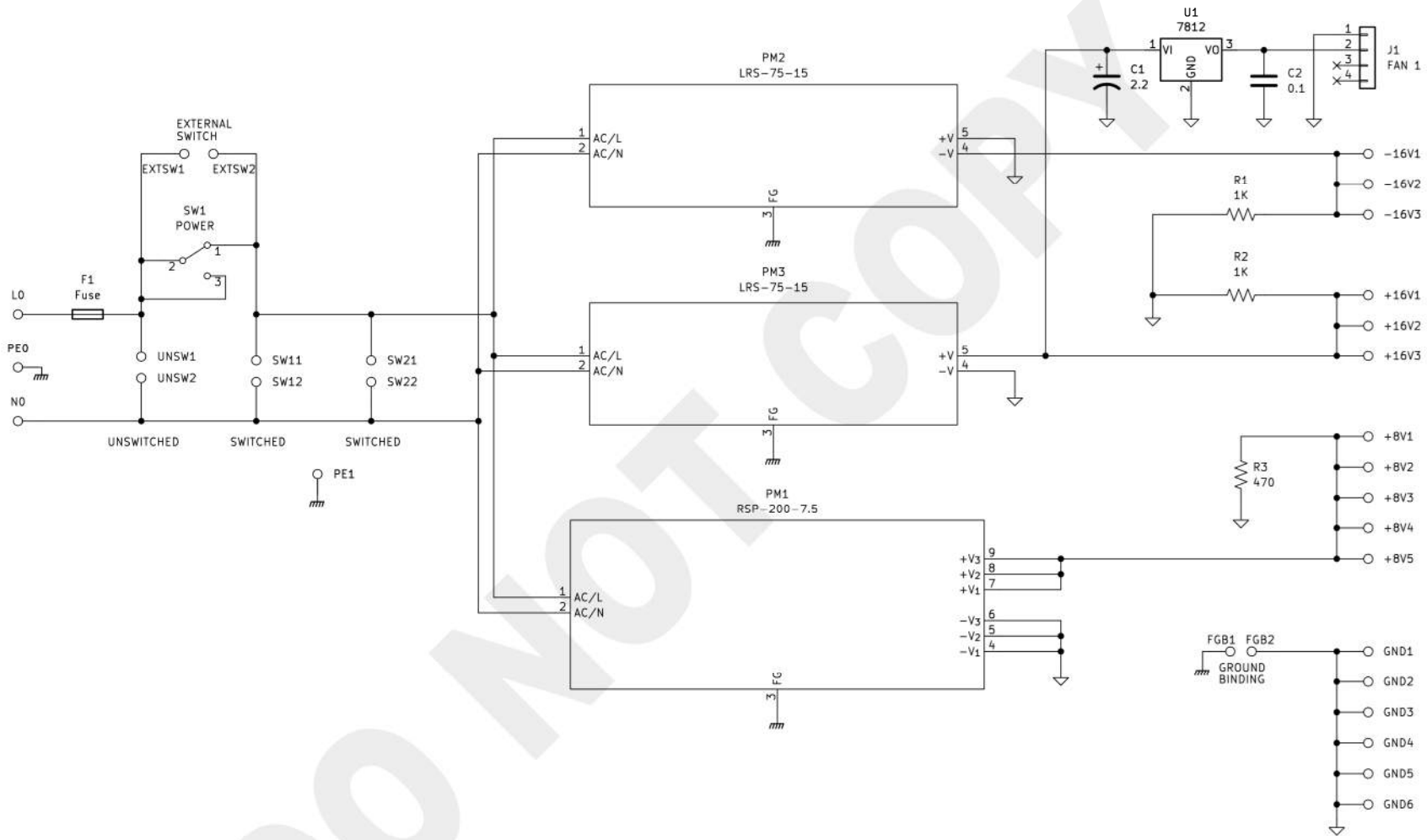
Dimensions	14.5 × 5.75 × 4.59 in (368.3 × 146.1 × 116.5 mm)
Weight	3.1 lb (1.4 kg)
PC Board Dimensions	14.5 × 5.75 × 0.063 in (368.30 × 146.05 × 1.6 mm)
PC Board Construction	FR4, two-layer 1 oz copper with tin/lead plate (lead-free HASL for the RoHS version) and solder mask on both sides, silkscreen on front side
PC Board Temperature Rise at Maximum Rated Current	Less than 2°C
+8V Voltage Adjustment Range	+6.0 to 9.0 VDC, +7.5 VDC default
+8V Current	0 to 26 A
±16V Voltage Adjustment Range	±13.5 to 18 VDC, ±15 VDC default
±16V Current	0 to ±4 A
+12V Fan Current	≤ 1 A
Typical Efficiency	89%
Mains Voltage Range	100 to 240 VAC, 47 to 63 Hz
Withstand Voltage	Mains to PE: 2 kVAC +8/±16/GND to PE: 500 VAC Mains to Outputs: 3 kVAC

For more information, consult the Mean Well RSP-200-7.5 and LRS-75-15 datasheets.

Table of Figures

Document Revision History

Revision	Date	Initial	Description
DR-1	5/29/2025	REW	Initial release



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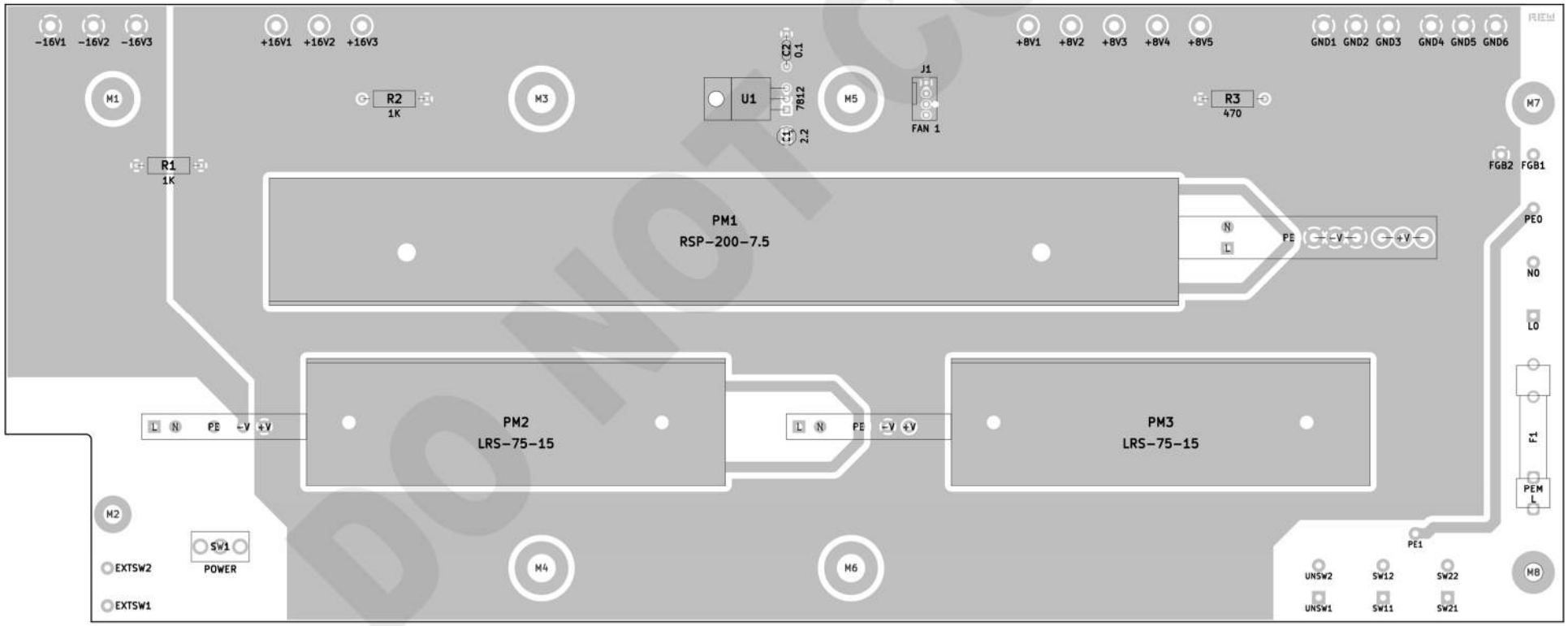

ASSEMBLY DIAGRAM