I-SERIES CABINET

USER MANUAL

IMSAI is a division of Parastream Technologies, Inc.

Printed in the USA.

The Standard of Excellence in Vintage Microcomputers

IMSAI

Contents

Errata

After the printing of this manual, the following issues were discovered.

Due to interference between the right card frame back mounting flange and the PEM nut associated with the cable clamp, the card frame cannot be raised up to the IEEE 696 height. This may be corrected by using a nibbler tool to remove 2mm (a little over $^{1}/_{16}$-inch) of the card frame mounting flange that is causing the problem.

This corrective action is only necessary if it is desired to move the card frame up to the IEEE 696 height. See CARD FRAMES for more information.

We apologize for this inconvenience.

Preface

From the president of Parastream Technologies, I would like to humbly thank you for your purchase of this classic IMSAI cabinet kit. Without your continued interest in the IMSAI product line, this product would never have been made. The last IMSAI products were shipped in 1979 from IMSAI Manufacturing Corporation in San Leandro, California, and around 2008 from the IMSAI division of Fischer-Freitas Corporation in Orangevale, California. The IMSAI division of Parastream Technologies has been shipping IMSAI products since 2024.

This project would not have been possible without RetroTechReboot, AKA ShadowTronBlog, who graciously loaned us the sheet metal parts from his unbuilt IMSAI 8080 kit. He has given me countless hours of advice, stories about his career and technical input. He has become a good friend. I am very proud of the results of our efforts.

Check out his video of the NOS IMSAI 8080 at

https://www.youtube.com/watch?v=BxJFUx2r5ps&t=2393s

or scan the QR code to the right.

I hope you enjoy building and using the cabinet as much as I did designing and producing the kit.

Sincerely,

Robert E. Weatherford
CEO / President
Parastream Technologies, Inc.
https://www.parastream.com

Introduction

The IMSAI I-Series cabinet is the next major release of the classic IMSAI 8080 cabinet by Joe Killian, IMSAI's first chief engineer. We started with an unbuilt IMSAI 8080 kit and meticulously reverse-engineered the parts. We then purchased several vintage IMSAI 8080s from three distinct eras. After we realized that we were chasing fabrication tolerance issues as well as a few probably intentional design changes, we decided to design a cabinet from scratch that was fit and function compatible with all our reference IMSAI 8080 cabinets.

We wanted to be sure that each of the new cabinet parts were compatible with existing cabinets, so the parts we produce may be used to replace or upgrade parts in existing cabinets.

We have made a few improvements over Joe's original design, most of which were enabled by newer technologies and standards.

- Replace the wrinkle finish paint with a durable textured powder coat finish.
- Add a C14-standard power entry port to accept power cords from any country. Of course, the original captive gray 8-foot long NEMA-15 power cord is available as an option.
- Replace four of the DB-25 back frame cutouts with six DE-9 cutouts.
- Add a new set of card frame mounting holes in the front and back frames to allow the card cage to be raised slightly to better handle IEEE 696-standard boards.

The IMSAI I-Series cabinet may be ordered in one of three configurations:

- Complete kit with an original 8-foot-long gray captive NEMA-15P power cord for the US.
- Complete kit with a C14 PEM (power entry module).
- Complete kit with a C14 PEM without the blue table top cover.

Cabinets ordered with a new power entry port are compatible with any IEC C13 electronic equipment power cord. These cabinet kits will not come with a power cord. As an electronics hobbyist, it is likely that you have at least one spare power cord for your locale. If you don't, many local electronics stores sell power cords. If that is not an option for you, we suggest you go to an online seller such as McMaster-Carr (scan the QR code to the right) and choose one for your country and personal preferences.

Functional Description

The IMSAI I-Series cabinet houses a power supply, backplane, and card cage supporting up to 21 S-100 slots. It also provides mounting for a front panel, and various I/O connectors on the back. It is constructed of 0.063" (1.6 mm) aluminum sheet metal with a golden chromate finish.

The table top cover is constructed of 0.125" (3.2 mm) aluminum sheet metal. It provides protection for the electronic components inside and assists in powered airflow using an optional fan. The standard finish for the cover is an IBM Blue textured powder coat.

The front of the cabinet is a gray escutcheon that mates with the front panel assembly. The standard finish for the escutcheon is IBM Gray textured powder coat. The standard escutcheon mates with the CP-A. As new front panels are released, matching escutcheon options will also be released.

The card cage may be configured to work with a backplane of up to 22 slots (one being reserved for the front panel). The card cage may also be raised from the original IMSAI height to work better with newer IEEE 696 boards and their ejectors.

The area of the cabinet to the right of the card cage is reserved for the power supply. The original hand-wired power supplies with the computer grade electrolytic capacitors, and the PS-28 or PS-28U circuit boards are compatible. The newer switch-mode PS-28S is also compatible with the cabinet.

The back of the cabinet has been extensively reworked to accommodate the connection methods used today.

- In addition to the traditional power cord, a standard PEM (power entry module) may be used instead, supporting a universal system of power cords.
- A $4^1/_2$" (114 mm) circular cutout supports a standard 120 mm cooling fan.
- Two $^1/_4$" (6.35 mm) mounting holes are located near the fan for auxiliary power switches and the like. Some users have installed power and/or fan switches here.
- Six $^5/_{16}$" (9.74 mm) mounting holes are for miscellaneous signal jacks like miniature audio.
- Three $^1/_4$" (6.35 mm) BNC cutouts may also be used for 3AG fuse holders.
- Six DE-9 and six DB-25 cutouts are typically for parallel and serial I/O.

For signal cables that do not conform to any of the cutouts supplied, there is a 9-inch wide (230 mm) cable clamp that can function as a strain relief.

Figure 1. IMSAI I-Series Cabinet with Cover

Figure 2. IMSAI I-Series Cabinet with PEM Option and no Cover

Parts List

There are two cabinet options which are listed in their own tables following the base cabinet.

Base Cabinet

Item	Part #	Qty	Description
Rubber Feet	20-00000004	8	Bumper, Tapered Square, 0.81 × 0.3", Gray
Screw	21-01120105	21	6-32×$^{5}/_{16}$" Phillips Pan Head Machine
Screw	21-01120108	6	6-32×$^{1}/_{2}$" Phillips Pan Head Machine
Screw	21-01120114	4	6-32×$^{7}/_{8}$" Phillips Pan Head Machine
Nut	21-10120101	4	6-32 Hex
Lock Washer	21-26120100	4	6 Internal Star
Finger Guard	70-90000001	1	120mm Fan Guard, Rev. 2
Front Frame	92-30003230	1	IMSAI 8080 Cabinet Front Frame, Rev. 3
Card Frame	92-30003330	2	IMSAI 8080 Cabinet Card Frame, Rev. 3
Back Frame	92-30003450	1	IMSAI 8080 Cabinet Back Frame, Rev. 5
Front Piece	92-30003521	1	IMSAI CP-A Switch Escutcheon, Rev. 2, Powder Coat
Cable Clamp	92-30003610	1	IMSAI 8080 Cabinet Cable Clamp, Rev. 1
Cabinet Base	92-30003720	1	IMSAI 8080 Cabinet Base Plate, Rev. 2
Cover	92-30003811	1	IMSAI 8080 Cabinet Table Top Cover, Rev. 1, Powder Coat
Label	92-30005110	1	IMSAI 8080 Cabinet High Voltage Caution Label (may be pre-installed on one of the card frames)
Label	92-30005210	1	IMSAI System Serial Number Label
Label	92-30005310	1	IMSAI System Mains Voltage Labels
Manual	98-15000400	1	IMSAI I-Series Cabinet User Manual

PEM Option

Item	Part #	Qty	Description
PEM	20-00010025	1	IEC Inlet C14, Horizontal Flange Mount (Schurter 6100.3200 or equivalent)
Screw	21-05550108	2	M3×8 Phillips Flat Head Machine
Nut	21-10550100	2	M3 Hex
Lock Washer	21-26550100	2	M3 Internal Star
Wire	92-80002100	1	CABLE CJ Assembly (3×4.8mm Insulated Faston pig-tails, 18 AWG, black/white/green)

Power Cord Option

Item	Part #	Qty	Description
Cord	20-00010011	1	Belden 17239 8 B1 Power Cord, 18 AWG, NEMA 5-15P to Free End, 2.44 m, 10 A, 125 VAC, Gray
Strain Relief	20-00010012	1	Power Cord Grommet with Strain Relief, MP5N4, SVT 18/3, 0.5×0.62", Black

Assembly Instructions

Before you begin, clear your workspace, and try to minimize distractions for the next couple of hours. It will take some care and patience during assembly to produce the best results. In addition to the usual electronics tools, you will need the following:

- #1 Philips head screwdriver (for the PEM option).
- #2 Philips head screwdriver.
- ¼-inch (6.5 mm) and ⅜-inch (if available) slotted screwdrivers.
- $^{5}/_{16}$-inch hex driver or wrench.
- Needle nose plier.
- Flush-cutting wire cutters.
- Wire stripper.

☐ Unpack the cabinet parts and check them against the parts lists enclosed in the package. If the cabinet is part of a system purchase, consult the system manual's unpacking instructions.

☐ Have the User Manuals ready for the backplane (i.e., EXP-22), front panel (i.e., CP-A), and power supply (i.e., PS-28S). It is recommended that you complete the assembly of these components before assembling the cabinet. It is also recommended that you assemble the CP-A before the backplane, as its assembly instructions call for an uninstalled card edge connector. NOTE: read the CARD CAGE section in the USER GUIDE before assembling the backplane, as it may affect how you decide to build it.

☐ If the cabinet kit includes a fan (FM, FM 12, FM 230) have it and its accompanying Installation Guide ready.

The basic assembly flow is to assemble the back frame, the base plate and front escutcheon with the backplane, power supply, and feet, followed by the front frame and the card guides, and finally the cable clamp.

Back Frame

The back frame holds the power inlet, cooling fan, and various I/O connectors. It also acts as a stiffener for the base plate along its width when viewed from the front or back.

Power Inlet

The back frame has two power inlet options. Follow one of the following applicable subsections.

PEM Option

While the PEM Option is best in most situations, you will have to decide regarding the backmost S-100 slot in the card cage. The cabinet kit comes with a CABLE CJ which has three color-coded power inlet wires with Faston connectors.

Using the connectors makes it easier to connect and disconnect the power supply, if that is important to you. The downside is that the connectors protrude sufficiently into the card cage that it will prevent the backmost S-100 slot from being used. Proponents of the connectors might argue that the backmost slot isn't useable anyway, especially with today's higher-profile DB-25 connectors.

Hard wiring the PEM to the power supply will allow the backmost slot to be used. Proponents of this arrangement might argue that the backplane is likely to be hard-wired to the power supply, so why bother with the connectors?

The following instructions assume the use of the connectors. If you want the hard-wired arrangement, cut off the connectors from the three wires, solder them as indicated to the PEM lugs. Decide ahead of time which PEM orientation (center blade up or down) you are going to use and solder the wires in the direction that will have them naturally heading toward the power supply bay. Cover the lugs and solder joints with heat shrink tubing.

The CABLE CJ is designed to be used with an IMSAI PS-C or other printed circuit board power supply. If you are using your own power supply, you will likely need to fashion your own wiring from the PEM lugs.

☐ Separate the three wires from the CABLE CJ assembly and slip the Faston connectors onto the PEM lugs according to the following table:

- Black wire goes on PEM lug **L**.
- Green wire goes on the center PEM lug (**PE** / **GND**).
- White wire goes on PEM lug **N**.

☐ Insert the PEM inlet into the rectangular opening near the fan cutout from the back side. It may be oriented in either direction (center lug up or down) according to your preference.

☐ Secure the PEM inlet to the back frame using the two sets of M3×8mm flat head machine screws, lock washers, and hex nuts.

Power Cord Option

☐ The power cord should be inserted using the special grommet in the ½-inch hole provided on the back panel near the 4½-inch fan cutout. Consult the power supply's User Manual for guidance on how much of the power cord should be left on the inside of the cabinet. If the power cord grommet is squeezed together with a pair of pliers before insertion into the cabinet back, it will ease the job of inserting this tight-fitting grommet. To insert the grommet, the power cord should be pulled through the hole nearly to the point where the grommet has been placed around the power cord, then the outer edge of the grommet can be grasped with a pair of pliers and squeezed slightly and inserted in the hole and worked in while slight tension is also being put on the cord from the back side to assist. Working this grommet in by rocking it back and forth works better than just pushing harder.

Fan

☐ If a fan is to be installed in the chassis, it should be assembled on the back frame according to the instructions in the fan kit's Installation Guide.

☐ If a fan is not to be installed in the chassis, the finger guard should be secured to the back frame using the four sets of 6-32×$^{7}/_{8}$" Phillips pan head machine screws, lock washers, and hex nuts. The finger guard should be installed with the manufacturer logo (located in the center) on the inside of the cabinet. If a fan is installed later, this hardware will be re-used.

Serial Number Label

Your IMSAI Cabinet has a unique serial number that identifies it. The serial numbers are sequentially assigned starting at 030001. The label is meant to be applied to the cabinet. Traditionally, the serial number label has been applied to the lower-left corner of the back frame.

An alternate location is inside the cabinet and may be the smart decision if you decide to change out the back frame for a different one in the future. Attach it to whichever cabinet piece you deem to be permanently associated with the cabinet, usually the base plate.

The serial number label is made with a permanent adhesive, so be sure to position it where you want before pressing it down.

Voltage/Frequency Label

The voltage/frequency labels indicate what voltage, frequency, and amperage the power supply is configured for. There are two versions of the label, one is the original where you write in the frequency and voltage. The other has check boxes for 115 V / 60 Hz and 230 V / 50 Hz and a space to write in the parameters if they are not specified by a check box. One of these labels should be placed near the power inlet or cord according to how the power supply is configured and fused.

These labels are semi-permanent and may be removed and replaced with a little effort.

Some writing instruments work better than others. Gel Pens, for example, do not work well because the label is not absorptive, and the ink does not dry in a reasonable amount of time. Other standard ink pens work well because they impress a negative relief in the label in addition to the ink. Sharpie® Ultra Fine Tip Markers also work well and may be erased with alcohol and re-written.

Base Plate

- ☐ Begin by orienting the base plate on your work surface such that the flanges are pointing downwards and running front to back. The two rows of mounting holes for the backplane should be running from front to back on the left-hand side.
- ☐ If a PS-C, PS-28, PS-28U, or other power supply with a large heavy transformer is to be installed, use all eight supplied feet following the placement diagram in FIGURE 3. Otherwise, use six feet following the placement diagram in FIGURE 4. The self-adhesive rubber feet can then be separated from each other, the protective backing removed and placed on the bottom of the base plate.

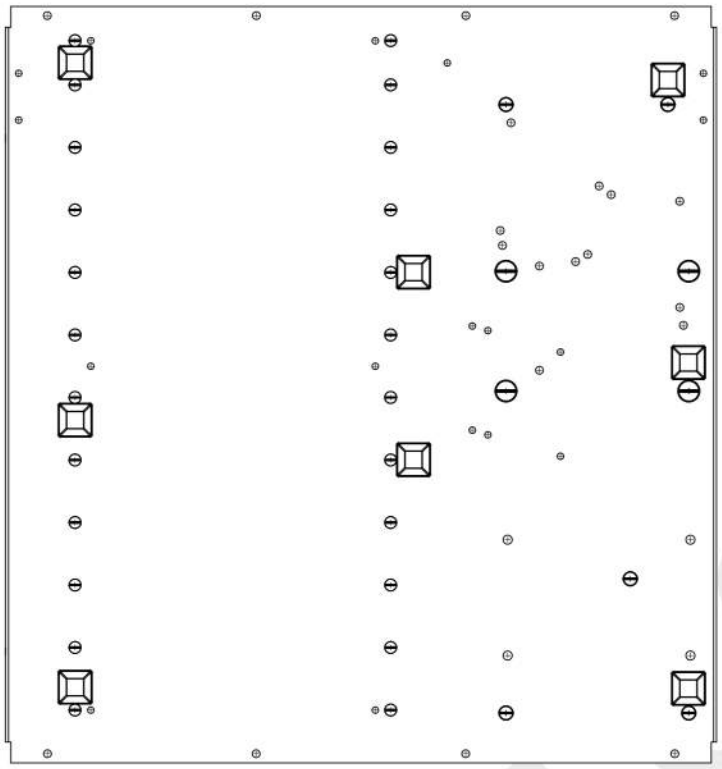

Figure 3. Base Plate Foot Placement with Heavy Transformer

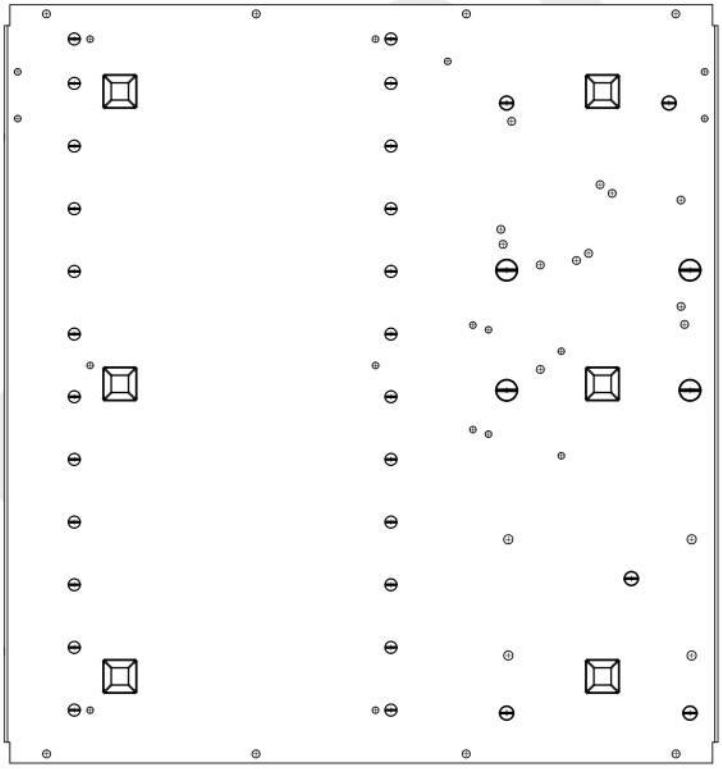

Figure 4. Normal Base Plate Foot Placement

- ☐ Rotate the base plate onto one of the flanges and attach the back frame to the back of the base plate using four 6-32×$^{5}/_{16}$" machine screws. Note that the back frame fits under the base plate such that the screws go through the back frame flange first, and then finally into the base plate's PEM nuts. This will stiffen the base plate and provide stability when turning the chassis on its side during subsequent assembly steps.
- ☐ Attach the Front Escutcheon on the base plate at the front of the computer using four 6-32×$^{5}/_{16}$" Phillips pan head machine screws. Note that the Escutcheon should fit under the base plate. Rotate the cabinet so it rests on its feet.
- ☐ Mount the assembled backplane onto the base plate according to the backplane's User Manual. Set the plastic card guides aside for later.
- ☐ Mount the assembled power supply onto the base plate according to the power supply's User Manual.
- ☐ Wire the power supply to the backplane according to the backplane's User Manual.

Front Frame

- ☐ The front frame can now be screwed to the base plate using five 6-32×$^{5}/_{16}$" machine screws. Note that the front frame fits on top of the base plate, set back about 1" from the Front Escutcheon.

Card Frames

Two identical card frame pieces come with the cabinet kit. One of them may have a label with red lettering with a warning about high voltage on one of the long flanges. This one is the right-hand frame. If the label is separate from the frame in the kit, you will apply it later.

Note that the two ends of the card frame are not symmetrical. The end with the wider space between the last small hole for mounting the card guide and the end flange is placed toward the back of the cabinet. The card frames mount to the front and back frames to form a card cage over the backplane.

The front and back frames have two sets of mounting slots for the card frames. The lower mounting slots set the card cage to the standard IMSAI 8080 height. This allows the boards to protrude over the top of the cage for better gripping during removal. The upper mounting slots set the card cage closer to the optimal height for IEEE 696 boards with ejectors. If every board in the system has IEEE 696 ejectors, then this mounting position is recommended. Otherwise, use the lower position.

- ☐ Install the two card frames between the front and back frames. The mounting flanges go inside the card cage. The labeled flange should be on top of the right card frame. Use two 6-32×$^{5}/_{16}$" machine screws at each end of each card frame. Position the screws in the center of the front and back frame slots for now.
- ☐ If the power supply caution label needs to be applied to the right flange, measure 2½" (64mm) from the front frame and make a mark on the card frame flange with a pencil. Holding the label's edges in one hand, peel the label from its backing. Position the label with the arrows pointing toward the power supply with the front edge on the mark. Try to keep a consistent $^{1}/_{16}$-inch (2mm) margin between the label edge and the edge of

the flange. The label's adhesive is permanent, so don't try to reposition it once it has made firm contact with the flange.

☐ Install the plastic card guides onto the card frames, two for each backplane card edge connector in the card cage, taking care that the wedge-shaped opening of the guide is positioned upwards. Care should be taken that the tabs are started into the hole when beginning to press the guide into place, otherwise one or both may be bent out flat and broken off. One end of the guide at a time should be inserted rather than trying to press both ends simultaneously.

☐ Insert at least three previously assembled or bare S-100 boards into the card cage such that the frontmost, backmost, and middle slots are used. Press each board firmly into the backplane card edge connector. If the boards do not fit well, you may adjust the card frames by loosening the mounting screws into the front and/or back frames. Re-tighten the screws when the adjustments are complete. Each board should be held in the card guides without excessive binding. Try swapping the board positions around and different boards if you have more than three. Sometimes the board width is off a little and can present challenges.

Board and cabinet manufacturing tolerances can sometimes make it difficult to find a position where the boards are snug all the way down into the card edge connector at the front, middle, and back of the card cage. Experiment with tighter at the bottom and looser at the top. If that does not do the trick, swap it around. In the end, the definition of "too loose" is that the board can "escape" the card guides. It is worth the effort to get the card cage alignment set before you move on to the front panel assembly. Once the front panel assembly is installed, you will not be able to make any changes to the front of the card frame.

☐ Remove all the S-100 boards from the card cage, as the power supply and backplane have not been tested yet.

Front Panel Assembly

☐ The I-Series cabinet requires some sort of front panel assembly for a finished, professional appearance. This may be a full operator's panel with lights and switches, or just a front dress panel. Follow the front panel's User Manual and install it in the cabinet.

Cable Clamp

☐ Cables that do not fit the connector holes on the back frame of the chassis may be clamped for strain relief at the top of the back frame using the L-shaped aluminum bar. Install using two 6-32×½" Phillips pan head machine screws. Depending on the thickness of the cables being clamped, either of the two sides of the angle may be used.

If you elected to mount the card cage at the higher IEEE position, the ½" screw closest to the fan position will interfere with the card frame mounting screw. If you are planning to run cables through the clamp, it is likely that the screw will clear. Otherwise, you can swap the $^{1}/_{2}$" and $^{5}/_{16}$" screws to rectify the interference.

Table Top Cover

It is not recommended that you install the cover at this time, because the system has not been checked out yet.

☐ To install the table top cover, slide the cover carefully over the chassis frame and hold in place with four 6-32×½" Phillips pan head machine screws. To avoid scratching the inside surfaces of the cover, gently pull the sides away from each other as you raise of lower it.

User Guide

The cabinet is designed to provide many years of service. It will support an ever-changing complement of boards and peripheral devices as your system evolves.

Card Cage

The card cage can accommodate up to 22 slot positions for S-100 boards.

Clearance Considerations

There are a few considerations to bear in mind when you arrange the boards in the card cage. Some of these considerations may affect how you decide to populate the card edge connectors and guides.

The front slot in the card cage has some limitations. It has less component side clearance than the other slots due to the front frame's flange. For example, the MPU-A's heat sink extends 0.50 inches (12.7 mm) above the board which makes insertion and removal into the front slot difficult. While it can be done, it requires contorting the MPU-A to get the heat sink past the flange. Other boards such as the MPU-85 fit in the front slot nicely.

The front slot will not accept a board with an ejector on the left side. This is due to the front frame's left rackmount flange. While you could perform chassis surgery to mitigate this clearance problem, you may want to consider removing the left-hand ejector from the board or moving the board to another slot.

The back slot is close to the back frame and may make routing the flat cable to the DE-9 and DB-25 connectors difficult or impossible. The current DB-25 cables extend further into the card cage than the original ones, making the clearance problems worse.

These considerations are reflected in the EXP-22 backplane's recommended arrangement for an 11-slot configuration, which skips the front and back card cage slot positions.

Arranging Boards

Working out the optimal arrangement of the boards in the system can cross the line between art and science. From a cable routing standpoint, the best arrangement is the MPU board in the front, the I/O boards in the back, and the others in the middle. This is usually a good starting point. In rare cases, some boards (especially the older ones) may work more reliably in a different slot relative to other boards.

Table Top Cover Care

While the powder coated table top cover finish is exceptionally durable, it is not immune to abrasion. The rubber feet from equipment placed on top of the cover may chemically break down cause discoloration over time. Consider small stick-on felt pads for old equipment to be placed on top of the cover, or replacing their rubber feet every few years. Avoid direct exposure to UV and sunlight to prevent long-term fading.

Periodic Maintenance

The cabinet top cover should be kept clean with mild soap (like dish detergent) and water using a soft brush. The acrylic front panel should be cleaned with a dry duster. Never get

the front panel wet, as it can damage the photo mask between the panels. Spot damp treatments may be used for fingerprints so long as you avoid working near the edges of the panels or any of the button head mounting screws. If the acrylic panel becomes scratched or otherwise abraded, it should be replaced. Contact the factory or the website's parts section to order replacement front panels.

Once a year or so, the cover should be removed and any dust blown out with compressed air. If you installed a fan in a positive pressure configuration with an intake filter, the filter must be checked often and cleaned or replaced as necessary to maintain proper airflow.

Specifications

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

External Dimensions	19.575 × 17.32 × 7.0 in (498 × 440 × 178 mm)
Weight (without any circuit boards)	Chassis only: 4.4 lb (2 kg) Cabinet w/cover: 11.1 lb (5 kg)
Construction	0.063 in (1.6 mm) and 0.125" (3.2 mm) 5052-H32 Aluminum sheet metal with PEM nut fasteners.
Finish	MIL-DTL-5541F Type 1 Class 3 Hexavalent Chromate.
Color Finish	Textured powder coat standard.
PEM Power Rating	IEC: 10 A / 250 VAC / 50 Hz UL/CSA: 15 A / 250 VAC / 60 Hz
PEM Dielectric Strength	> 2 kVAC between L-N > 2 kVAC between L/N-PE (1 minute at 50 Hz)
Fan Cutout	⌀ $4^1/_2$ in (4.50 in, 114.3 mm)
Fan Mounting Hole Spacing	$4^1/_8$ in (4.125 in, 104.8 mm)
Auxiliary Power Switch Mounting Hole	⌀ $^1/_4$ in (0.25 in, 6.35 mm)
Power Cord Mounting Hole	⌀ $^1/_2$ in (0.50 in, 12.7 mm)
PEM Cutout Dimensions	1.107 × 0.792 in (28.127 ×20.127 mm)
DB-25 Cutout Dimensions	1.641 × 0.440 in (41.66 × 11.18 mm)
DE-9 Cutout Dimensions	0.771 × 0.440 in (19.58 × 11.18 mm)
Audio Connector Cutout	⌀ $^5/_{16}$ in (0.313 in, 7.94 mm)
BNC Connector Cutout	⌀ $^1/_2$ in/0.035 flat (0.50/0.035 in, 12.7/0.89 mm)

Table of Figures

Revision History

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