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Model 1507

Powered CAMAC Minicrate

INSTRUCTION MANUAL

December, 1998

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1502/07/72 Powered CAMAC Crates

Powered CAMAC Crates 1502/07/72

Features - 1502 & 1572

- Mandatory voltage (+24, +6, -6, -24) available, all models
- All units also provide ±12V outputs
- Input voltage range selections on 1502
- Voltage and current metering

Features - 1507

- 11-slot capacity
- 350 W switching power supply
- Over-current and over-voltage protection
- Lightweight construction
- Desktop mounting
- Fold-down front rail for ease of module access

General Description *(Product specifications and descriptions subject to change without notice.)*

This series of powered CAMAC crates fully complies with CAMAC specification IEEE-583. Crates include the CAMAC Dataway with an 86-contact PC edge connector at each station. All units include one or more self-contained blowers as well as a power supply which converts the AC source to the mandatory DC CAMAC Dataway voltages (±6V and ±24V) and also provide the optional ±12V outputs.

TYPE SUMMARY

1502 25-Slot Crate
1507 11-Slot Crate
1572 25-Slot Crate, separate power supply

All crates in this series are arranged for 19-inch relay rack mounting and include module-mounting holes for CAMAC only. NIM holes are only available on certain options (refer to ORDERING INFORMATION) The Model 1502 is a full-featured, 25-station CAMAC crate. It includes a rear-mounted power supply and a front removable fan tray. The crate can deliver up to 525W of power. The power supply features ±6V outputs shared to 52A and ±24V outputs shared to 9A. The front panel of the fan tray includes an over-temperature warning LED, a switch-selected digital meter for monitoring all voltages and currents, and removable air-intake filters. Options are available with a rear I/O mounting bar for affixing 36-contact PC edge connectors and with a status bit on a rear LEMO connector. The Model 1572 is similar to the 1502 crate except that the power supply is mounted separately.

1507 Only

The Model 1507 CAMAC crate is an IEEE-583 compatible chassis with mounting positions for 11 modules. It includes a six-layer CAMAC Dataway with an 86-contact PC edge connector at each position, two self-contained blowers for module cooling, and a 350W switching power supply. This power supply accepts a 47 or 65 Hz AC input, ranging from either 100V to 130V or 200V to 260V.

Selection in input voltage range is made by a switch at the line connector. All supplies are regulated to limit changes in the output voltages to less than 0.2% for a change from no-load to a fully loaded state. Each supply has over-voltage and thermal shutdown protection. Over-current shutdown protection is also provided on the 6V and 24V supplies, and current limiting is used on the 12V supplies. Output ripple is less than 10 mV peak-to-peak on the 6V supplies, less than 50 mV peak-to-peak on the 12V supplies, and less than 75 mV peak-to-peak on the 24V supplies. The 1507 crate is primarily designed to house modules with front-panel mounted I/O connectors. Its small size and weight make it easy to move around a bench or desktop. A fold-down rail under the front of the enclosure facilitates access to module front panels.

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Model	+24V	-24V	Shared to	+12V	-12V	Shared to	+6V	-6V	Shared to
1502/72	6A	6A	9A	3A	3A	6A	52A	52A	52A
1507	2.5A	2.5A		1.5A	1.5A		15A	15A	

NOTES:

1. On the 1502 and 1572, the ±V supplies are derived from the ±24V sources; therefore, the +12V load must be considered part of the +24V load and the -12V load.

2. All models provide current foldback limiting and over-voltage crowbar protection for all output voltages.

3. All power supplies are of the linear type, except for the 1507, which is a switching supply.

Ordering Information

Model	# of Slots	I/O Bar	Status Output	NIM Holes	Power Supply	Size (cm) (H/W/D)	Weight
1502-P3C	25	No	No	No	Self-Contained 525 Watts	31.1/48.3/55.9	36kg
1502-P3D		Yes	No				
1502-P3E		No	Yes				
1502-P3F		Yes	Yes				
1502-P3G		No	No	Yes			
1502-P3H		No	Yes				
1507-P3A	11	No	No	No	Self-Contained 350 Watts	31.8/30.0/38.8	11.4 kg
1507-P3B							
1572-P3C	25	No	No	No	Separate 525 Watts	31.1/48.3/29.9	36 kg
1572-P3D		Yes					
1572-P3E		No	Yes				
1572-P3F		Yes					

Notes:

1. The 1572 includes a separately mounted power supply: 22.2 cm (8 ¾ in) x 48.3 cm (19") x 38.1 cm (15").
2. When ordering, state the desired AC line voltage. The unit will be strapped and fused for that voltage.
3. Options are available with a rear I/O mounting bar for affixing 36-contact PC edge connectors. With this option, five sets of I/O adapter blocks are included (for five connectors). Additional adapter block kits can be ordered as Model 5962-Z1A (with five sets of blocks per kit).
4. Model 1507-P3A 11-slot Powered CAMAC Minicrate 120/220 V, 50/60 Hz
   Model 1507-P3B 11-slot Powered CAMAC Minicrate 120/220 V, 50/60 Hz, Rack mountable

Accessories

Model 5962-Z1A Adapter Kit for 36-contact Rear I/O Connectors (five sets of adapter blocks)
Model 1507-001 Rack mounting kit for Powered CAMAC Minicrate

Spares - Crate Subassemblies

Model 1502-110 Fan Unit
Model 1502-200 Power Supply (for - P2 only)
Model 1502-250 Power Supply (for - P3 only)
Model 1502-320 Crate

Model Number Updates - Please note the following changes:
Models 1510 and 1525 are no longer available

111802

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1 CAMAC MINICRATE MODEL 1000 GENERAL DESCRIPTION

The Data Design CAMAC Minicrate Model 1000 is a CAMAC (IEEE 583) compatible mainframe containing eleven individual module stations. An integral power supply furnishes up to 350 watts of power at all six normal CAMAC operating voltages. The crate controller which normally occupies two of the module positions within a CAMAC system is installed into stations 10 and 11 of the Minicrate. The back plane meets all of the specifications of the CAMAC standard including the revision permitting -6V on pin 79 of the module connectors. The stations addressed through the dataway include 1 through 10. Other than the missing stations, the Minicrate operates the same as a full size CAMAC crate. An opening in the rear of the Minicrate provides a convenient access to the auxiliary connectors contained on many CAMAC modules. A tilt bail under the unit permits the Minicrate to operate with the modules tilted at a more readable position.

The Minicrate is designed to operate on line voltages from 100V to 240V. A rear panel voltage selector sets the power supply to operate from the desired line voltage source. The voltage selector is generally factory installed for the line voltage of the country to which the Minicrate is shipped.

The Minicrate contains a highly efficient switching power supply capable of supplying over 350 watts. The power supply has completely separate positive and negative sections so that the current ratings are based upon individual use and not shared load conditions. Separate windings exist on the power supply output transformers for each supply voltage, including the 12V and 24V supplies. The 24 volt outputs are regulated by magamp regulators, while the 12V supplies are linearly regulated. Based on its design, the total efficiency of the power supply exceeds 75%. In addition, secondary filters on each output reduce the ripple and noise to a comparatively low value for a switching supply. A separate cooling fan within the Minicrate power supply compartment provides adequate cooling as well as decouples any of the power supply heat from the module enclosure.

The module enclosure compartment of the Minicrate contains two cooling fans. Up to 130 CFM of cooling is supplied to the CAMAC module area. These fans as well as the fan in the power supply compartment are brushless DC type. This design eliminates any 60/50Hz voltages within the CAMAC module area thereby reducing the possibility of coupling to a susceptible module. The fans operate from the two 6V supplies, through a special power line filter. Module cooling is enhanced by the use of steel guide rail assemblies designed with a substantial open aperture to permit a high degree of airflow.

A rack mount kit is available to install the Minicrate within a standard EIA rack enclosure. The kit consists of two angle sections which mount to the case of the Minicrate via three screws on each side. The rack mount kit may be ordered from Data Design, part number RM10, and is normally furnished in a black color. In some instances, it may be required to remove the tilt bail assembly when the rack mount kit is installed.

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The Minicrate has two stage RFI protection to minimize coupling into the crate from external line conditions, as well as help to prevent line coupled interference out of the crate. These filters consist of common mode chokes, one on the power supply board and the other one within the power line entry IEC connector. In addition, the all metal enclosure and shielded power supply compartment provide a measure of isolation from radiated RFI.

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1.1 General Specifications

Number of Stations
Eleven (includes 2 used for crate controller)

Operating Position
Desktop in level or tilt position
Rack mount via optional kit

Module Cooling Provision
Two 70 CFM fans in module area

Power Connection
IEC line interface connector on rear panel

Minicrate Output Voltage

+6V	0-15A
-6V	0-15A
+24V	0-2.5A
-24V	0-2.5A
+12V	0-1.5A
-12V	0-1.5A

Power Supply Protection
- Over voltage shutdown protection on all supplies
- Over current shutdown on 6V and 24V power supplies
- Current limiting on 12V supplies
- Thermal protection shutdown

Output Voltage Regulation

6V	better than 0.2%
24V	better than 0.2%
12V	better than 0.2 %

Input Voltage

120 V Range	100V to 130V
240 V Range	200V to 260V
Frequency	47 to 65 Hz

Input power
- 450 watts maximum at full load
- Line Regulation better than 0.2%

Power Supply Cooling
15 CFM fan in power supply compartment

Output Ripple

6V	less than 10 mV
24V	less than 50 mV
12V	less than 50 mV

Line RFI filtering
Two stage RFI filter incorporating common mode and differential filtering

Voltage Selection
Rear Panel
120 V selection use 7A slow blow ceramic fuse
240V selection use 4A slow blow ceramic fuse

Size
13" high 33 cm (includes feet)
12" wide 30.5 cm
151/2" deep 39.4 cm

Weight
25 lb (11.3 Kg) unit
30 lb (13.6 Kg) shipping

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1.2 Power Supply Protection Circuit Description

The Model 1000 Minicrate has several circuits to prevent damage to the installed modules as well as protect the power supply from certain abnormal operating conditions. The protection circuits protect against excessive output voltage as well as from an installed module shorts on one of the power supply connections. Unlike linear power supplies, switching power supplies do not usually produce high line output voltages under failure conditions. However, an installed module may have a short between two of its supply pins causing the lower voltage to rise. In case of a short circuit or extreme overload the protection circuit is needed to prevent damage to the inverter transistors which may be damaged within microseconds. For those reasons, the Minicrate was designed with the following circuit protection.

1) **Over voltage protection on each output**. This protection is a two stage type which consists of fast acting transient protectors for high speed protection as well as a slow activation sensors for abnormal voltage on an output.

2) **Over current sense circuits** detect a short circuit on either of the 6V supplies or the 24V supplies. This protection consists of fast acting current sense circuits monitoring both of the primary currents of the positive and negative power supply sections as well as individual monitors on the 24V outputs. The 12V supplies use three terminal integrated circuit regulators and have their own current limiting.

3) **An excessive temperature sensor** on the heat sink assembly containing the output semiconductors is designed to trip when the temperature reaches 75 degrees C.

Each of the protection circuits when activated generates a latched shutdown condition, which effectively turns off the drive to the power supply inverter for both the positive and negative sections. The latched shutdown can only be reset by turning off the Minicrate. An indication that the latched shutdown condition exists is that the front panel power indicating light will be on but no output will be produced and the cooling fans will not be operating. Once the fault condition is removed the Minicrate will operate normally as soon as it is turned on again. If the fault condition is still present, the power supply will turn on for a fraction of a second as the crate is switched on and then return to the latched shutdown condition.

The excessive temperature sensor may be activated even if the Minicrate is operated within power limits if some obstruction of airflow to the power supply exists. It is important to keep the top of the Minicrate clear, especially the area directly over the cooling fans. If it is desired to operate the Minicrate at power levels near the maximum, some increase in cooling may be produced by tilting the unit using the bail under the crate.

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1.3 General Operating Safety Considerations

The Model 1000 Minicrate switching power supply is a type referred to as an off line switcher. This style of supply does not use any isolation transformer between the input power line and the primary inverter transistors, load isolation instead being provided by the transformers in the inverter. For this reason, the entire primary circuit of the Minicrate power supply is elevated at a high voltage. In addition, contact with even a single point of the primary circuit with a grounded lead may result in damage to the power supply, injury and/or severe electric shock to personnel. For these reasons, it is important not to operate the Minicrate without the outer cover installed where contact to the power supply is possible.

In the case of failure of the power supply, it is strongly recommended that the unit be sent back to the factory for service. Power supplies of this type are not simple to fix and require personnel familiar with the technology. In addition, without special equipment, work on the power supply will subject personnel to the possibility of injury through direct contact with high voltage circuits.

The Minicrate has been designed with operator safety features including:

- Power switch switches both sides of the power line.
- Use of international approval components on AC line circuitry, including power line filtering. 3750V insulation on inverter power transformers.
- Chassis is grounded via power line grounding terminal on AC plug.

UNDER NO CIRCUMSTANCES SHOULD THE MINICRATE BE OPERATED WITH THE GROUNDING TERMINAL OF THE POWER LINE PLUG REMOVED OR DEACTIVATED. In addition to possibility of electric shock, loss of the ground connection would cause the RFI protection of the Minicrate to be reduced due to the lack of a ground path for the RFI currents.

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Appendix A
SETTING OPERATING VOLTAGE

Selection of operating voltage (line voltage) is accomplished by removing the jumper card in the power input module on the back of the SCSICrate, orienting it to the proper configuration and then reinserting the card into the module. This *must* be accompanied by the replacement of the fuse with one of the proper rating for the line voltage selected. Only ceramic slow blow or time delay type fuses are to be used in the power input module.

Procedure for changing operating voltage:

1) Turn the SCSICrate off and remove power cord from the power input module.

2) Slide plastic window on the power input module upward to expose fuse.

3) Remove the fuse by pulling the plastic "Fuse Pull" lever out and up.

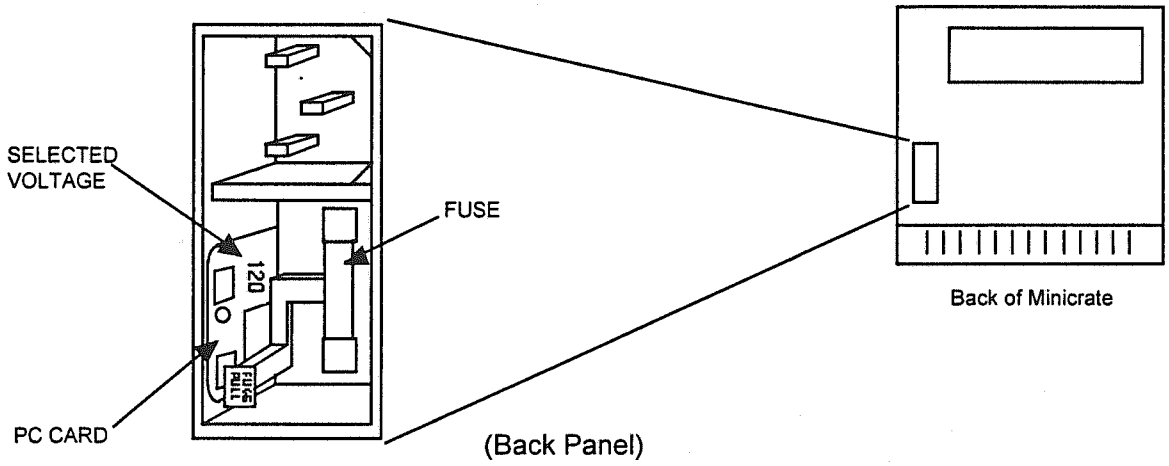
4) Return the "Fuse Pull" lever to the down position and look inside the power input module for a large white number on the jumper card (i.e. 100, 120, 220 or 240). This indicates the voltage selected.

5) To change the voltage selection, return the "Fuse Pull" lever to the up position and with a pair of small pliers and pull the jumper card straight out.

6) There are two selections on each side of the card, 120/240 on one side, and 100/220 on the other. Reinsert the PC card with the required voltage number visible after the card is inserted.

7) Replace the fuse with one of the proper rating. For 100/120V use 7A slow blow fuse. For 220/240V use a 4A slow blow fuse. **Failure use the correct fuse may result in damage to the power supply circuitry and may cause injury.**

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Manufacturers product information for power input module fuses:

Cooper/Bussman - MDA Time Delay 1/4 inch x 1 1/4 inch fuse, CERAMIC
--- Both 4A and 7A fuses

Littelfuse - 3AB SLO-BLO fuse
--- 4A, CERAMIC, Littelfuse # 326004
--- 7A, CERAMIC, Littelfuse # 326007

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