ORTEC®

Model 4001C
Modular System Bin
Operating and Service Manual

Advanced Measurement Technology, Inc.

a/k/a/ ORTEC®, a subsidiary of AMETEK®, Inc.

WARRANTY

ORTEC* warrants that the items will be delivered free from defects in material or workmanship. ORTEC makes no other warranties, express or implied, and specifically NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

ORTEC's exclusive liability is limited to repairing or replacing at ORTEC's option, items found by ORTEC to be defective in workmanship or materials within one year from the date of delivery. ORTEC's liability on any claim of any kind, including negligence, loss, or damages arising out of, connected with, or from the performance or breach thereof, or from the manufacture, sale, delivery, resale, repair, or use of any item or services covered by this agreement or purchase order, shall in no case exceed the price allocable to the item or service furnished or any part thereof that gives rise to the claim. In the event ORTEC fails to manufacture or deliver items called for in this agreement or purchase order, ORTEC's exclusive liability and buyer's exclusive remedy shall be release of the buyer from the obligation to pay the purchase price. In no event shall ORTEC be liable for special or consequential damages.

Quality Control

Before being approved for shipment, each ORTEC instrument must pass a stringent set of quality control tests designed to expose any flaws in materials or workmanship. Permanent records of these tests are maintained for use in warranty repair and as a source of statistical information for design improvements.

Repair Service

If it becomes necessary to return this instrument for repair, it is essential that Customer Services be contacted in advance of its return so that a Return Authorization Number can be assigned to the unit. Also, ORTEC must be informed, either in writing, by telephone [(865) 482-4411] or by facsimile transmission [(865) 483-2133], of the nature of the fault of the instrument being returned and of the model, serial, and revision ("Rev" on rear panel) numbers. Failure to do so may cause unnecessary delays in getting the unit repaired. The ORTEC standard procedure requires that instruments returned for repair pass the same quality control tests that are used for new-production instruments. Instruments that are returned should be packed so that they will withstand normal transit handling and must be shipped PREPAID via Air Parcel Post or United Parcel Service to the designated ORTEC repair center. The address label and the package should include the Return Authorization Number assigned. Instruments being returned that are damaged in transit due to inadequate packing will be repaired at the sender's expense, and it will be the sender's responsibility to make claim with the shipper. Instruments not in warranty should follow the same procedure and ORTEC will provide a quotation.

Damage in Transit

Shipments should be examined immediately upon receipt for evidence of external or concealed damage. The carrier making delivery should be notified immediately of any such damage, since the carrier is normally liable for damage in shipment. Packing materials, waybills, and other such documentation should be preserved in order to establish claims. After such notification to the carrier, please notify ORTEC of the circumstances so that assistance can be provided in making damage claims and in providing replacement equipment, if necessary.

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SAFETY INSTRUCTIONS AND SYMBOLS

This manual contains up to three levels of safety instructions that must be observed in order to avoid personal injury and/or damage to equipment or other property. These are:

DANGER Indicates a hazard that could result in death or serious bodily harm if the safety instruction is not observed.

WARNING Indicates a hazard that could result in bodily harm if the safety instruction is not observed.

CAUTION Indicates a hazard that could result in property damage if the safety instruction is not observed.

Please read all safety instructions carefully and make sure you understand them fully before attempting to use this product.

In addition, the following symbol may appear on the product:

ATTENTION – Refer to Manual

DANGER – High Voltage

Please read all safety instructions carefully and make sure you understand them fully before attempting to use this product.

SAFETY WARNINGS AND CLEANING INSTRUCTIONS

DANGER Opening the cover of this instrument is likely to expose dangerous voltages. Disconnect the instrument from all voltage sources while it is being opened.

WARNING Using this instrument in a manner not specified by the manufacturer may impair the protection provided by the instrument.

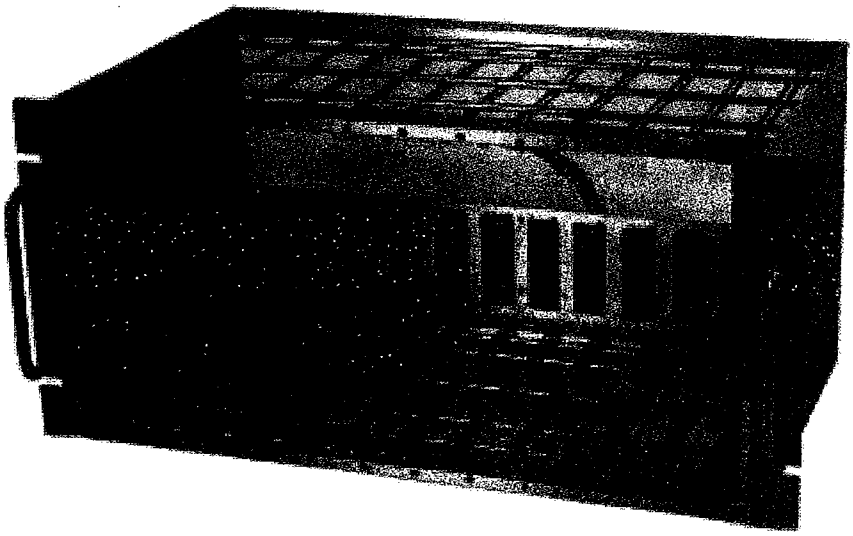
Cleaning Instructions

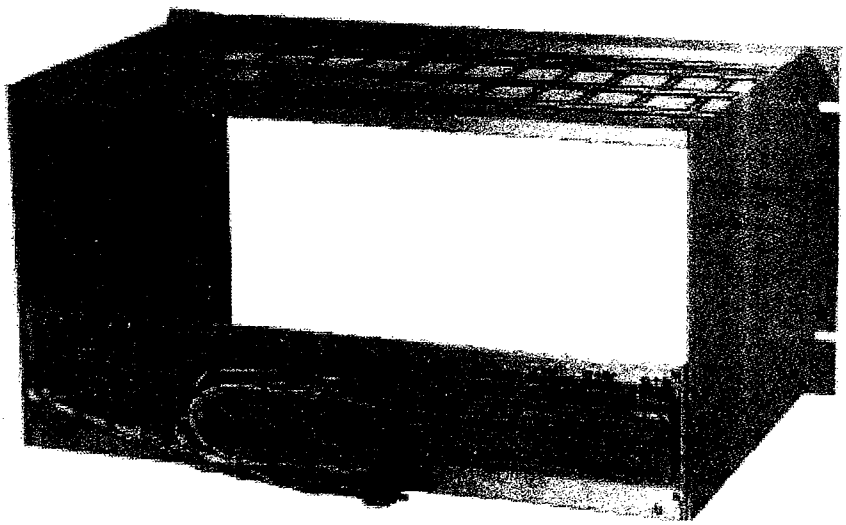
To clean the instrument exterior:

- Unplug the instrument from the ac power supply.
- Remove loose dust on the outside of the instrument with a lint-free cloth.
- Remove remaining dirt with a lint-free cloth dampened in a general-purpose detergent and water solution. Do not use abrasive cleaners.

CAUTION To prevent moisture inside of the instrument during external cleaning, use only enough liquid to dampen the cloth or applicator.

- Allow the instrument to dry completely before reconnecting it to the power source.





ORTEC MODEL 4001C MODULAR SYSTEM BIN

1. DESCRIPTION

1.1. DOE STANDARD MODULE PROGRAM

The ORTEC 4001C Modular System Bin is compatible with the recommended standards of the "Standard NIM Instrumentation System" Report DOE/ER-0457T. This report provides standards for a modular instrument system that allow electrical and mechanical interchangeability of units made in conformance with the standards. The standards prescribe the necessary mechanical dimensions and connector types to ensure mechanical interchangeability. They also specify standard power supply voltages and pin assignments in the connectors so that electrical interchangeability is assured, at least with respect to the main connector joining module to bin.

The Model 4001C Bin is constructed of wire-form grids to ensure unimpeded ventilation for the instruments that are operated in the bin. The adjustment-free modules guides are superior to the requirements specified in DOE/ER-0457T. These hardened steel guides feature generous openings, and because of their highly-polished nickel plating, offer a low friction coefficient. Aluminum alloy side plates are precision-formed and protected with a painted finish. Either the Model 4002A or 4002D Power Supply may be attached to the precision-stamped plated-steel connector mounting plate.

The Model 4001C Bin distributes all dc and ac power from the power supply to the module connectors. Very low impedance levels are provided by the use of heavy-duty copper bus bars, wire, and printed wiring board (PWB), ensuring a uniform voltage output to even high-power modules. Also available by special order is a wired-bus bin which enables the user to adapt the standard wiring to meet special needs.

The standards currently specify power supply voltages of plus and minus 6, 12, and 24 V dc and of 117 V ac delivered to assigned module connector pins. The available current specified to each pin has undergone some change with successive issues of the standards. Refer to the most recent issue of DOE/ER-0457T and addenda for current requirements. Also, since power supplies of earlier manufacture conformed to earlier versions of the standards, the user should become familiar with the specifications of the particular supply in use to determine the available current at each voltage.

Twelve basic module widths of 3.34 cm (1.35 in.) each are provided in a standard bin. Modules may be of single width or any multiple thereof as required by the individual module design. However, all 12 module connectors are provided in the standard bin, allowing any desired combination of module location. Two module and bin heights are provided by the standards: 22.23 cm (8-3/4 in.) and 13.34 cm (5-1/4 in.). These standard heights, as well as the basic external mounting dimensions of the bin, conform to the established ASA standards for relay rack mounting of electrical equipment. There the DOE/ER-0457T standard bins will mount in standard relay racks along with other rack-mounted equipment.

The DOE-ER-0457T standards deal only with requirements for electrical and mechanical interchangeability. They do not deal with circuit designs or methods except to the extent of the power supply voltage standards.

In addition to the firm requirements designated as "Standards" in DOE/ER-0457T, there are"Preferred Practices" which deal with subsidiary matters in the interest of suggested further compatibility. Included in the Preferred Practices are standard linear and logic signal parameters which, if observed, allow compatible interconnections between instruments.

1.2. ORTEC MODULAR INSTRUMENTS

ORTEC modular nuclear instruments conforming to the standards of DOE/ER-0457T are designed for insertion and operation in a Model 4001C Bin with an attached mating power supply. In addition to meeting the basic requirements of DOE/ER-0457T, each ORTEC module also provides two additional compatibility features:

1. Where applicable, the standard linear and logic signal parameters of the Preferred Practices of DOE/ER-0457T are used, providing compatible interconnections between instruments.

2. The power supply demand of any given ORTEC module is generally limited to no more than its proportional share of the occupancy of bin space. In this way, the user does not have to compute the power supply total demand and compare this to the capability of the supply.

These ORTEC instrument modules are made only in the 22.23 cm (8-3/4 in.) high standards module package. The panel space requirements of this type of research instrumentation have precluded the use of the smaller 13.34 cm (5-1/4 in.) standard height.

1.3. ORTEC 4001C MODULAR SYSTEM BIN

The ORTEC 4001C Modular System Bin provides mounting space for 12 standard module widths of the 22.23 cm (8-3/4 in.) high type. The 12 corresponding module connectors are provided with necessary wiring for distribution of all of the standard power supply voltages. The Model 4001C Bin has standard power supply voltages that are distributed to the module connectors through bus bars. These power distribution circuits terminate in the standard connector prescribed by DOE/ER-0457T for connection to the power supply. A small control panel, not occupying any of the available module space, is located at the right side of the bin, providing test points, a control switch, and indicator lamps for the power supply. Further description of the Model 4001C Bin is given in the remaining sections of this manual.

1.4. POWER SUPPLY CONSIDERATIONS

The power supply provisions of DOE/ER-0457T allow either a supply mounted on the rear of the standard bin or an external supply, possibly furnishing power to several standard bins. Specified mounting-screw dimensions and a standard power connector make the bin-mounting power supplies interchangeable when they are made to the DOE/ER-0457T standards.

The ORTEC Model 4002A or 4002D Power Supply, which conforms to the requirements of DOE/ER-0457T in force at time of manufacture, is usually furnished with the Model 4001C Bin. Please refer to the instruction manual provided with these power supplies.

2. SPECIFICATIONS

MECHANICAL TOLERANCES In accordance with DOE/ER-0457T, provide for interchangeability of all standard modules.

PANEL DIMENSIONS Standard relay rack, 22.23 cm (8-3/4 in.) high, 48.26 cm (19 in.) wide.

DEPTH BEHIND PANEL Without power supply, 26.6 cm (10.5 in.); with Model 4002A Power Supply, 40.6 cm (16.0 in.); with Model 4002D Power Supply, 53.5 cm (21.1 in.).

MODULE CONNECTORS 12 connectors each as specified by DOE/ER-0457T.

INSTALLED WIRING All connectors of the Model 4001C are wired in parallel for +6 V, -6 V, +12 V, -12 V, +24 V, -24 V, high-quality power return and 117 V ac, in accordance with DOE/ER-0457T pin assignments, with interface connector furnished for connection to power supply as required by DOE/ER-0457T. The Model 4001C is equipped with PWB with copper bus bars on the +6 V, -6 V, +12 V, -12 V, +24 V, -24 V (AWG #14 equivalent) and for the power ground return (AWG #10 equivalent).

CONSTRUCTION Aluminum alloy side members with nickel-chromium-plated handles on front panel mounting flanges. Top and bottom members are high-tensile steel rod weldments, nickel-plated, containing module guides. Rear connector plate is steel, cadmium-plated.

WEIGHT
Net Model 4001C, 4.5 kg (10 lb); with Model 4002A Power Supply, 10.5 kg (23 lb); with Model 4002D Power Supply, 15.8 kg (35 lb).
Shipping Model 4001C, 7.3 kg (16 lb); with Model 4002A Power Supply, 14 kg (30 lb); with Model 4002D Power Supply, 23.2 kg (51 lb).

3. INSTALLATION INSTRUCTIONS

3.1. POWER SUPPLY INPUT VOLTAGE

The ORTEC Model 4002A or 4002D Power Supply that usually accompanies the Model 4001C Bin may be used on either 117 V or 230 V, 50 or 60 Hz, input power. The conversion from one voltage to the other is accomplished by a slide switch located on the rear of the power supply and labeled as to voltage choice. However, it is prudent to check this switch for proper setting before operating the supply on 230 V. The power transformer is tapped for a simple conversion to 100 V or 200 V input levels.

Note that when the power supply is operated from 117 V input power, a direct connection provides the 117 V ac power to the assigned pins in the module connectors and the amount of 117 V power available is limited only by the fuse. However, when input power is 230 V, the 117 V ac power provided for the module connectors is limited by transformer ratings in the power supply, as stated in the power supply specifications.

The fuse supplied in the power supply is the proper one for input voltage selection as shipped. If a field change of input voltage is made, the proper fuse change should be made as outlined in the power supply instruction manual.

3.2. INSTALLATION IN RACK

The mounting provisions of the Model 4001C Bin conform to the well-established ASA standards for rack-mounting equipment. The mounting holes at the edge of the panel will match the standard spacing of tapped 10-32 holes provided in the standard relay rack. The use of the usual oval-head screws and cup washers is recommended. Mechanical support of the bin may be entirely from the panel members. However, the use of horizontal guide brackets to support the bottom of the bin will facilitate removal of the bin from the rack and will remove strain from the bin and rack.

The basic design of the DOE/ER-0457T standard bin and modules provides for cooling by natural convection flow. Several bins can be mounted above each other without heat problems in the usual installation. However, one should not mount heat-producing vacuum tube equipment or other large sources of heat in the same cabinet with the standard bin without accounting for the temperature use.

The use of cooling fans in equipment cabinets will reduce the operating temperature of the enclosed equipment. However, it will also invariably couple the circuits involved more tightly to the temperature variations of the environment. In systems installation requiring the ultimate in stability of operating parameters, the best practice is to provide only for natural convection cooling of the equipment. This provides long time constants between the equipment and external temperature variations, with resultant smaller variations, even though the average absolute temperature may be higher.

ORTEC modules are designed with all major signal connections on the front panel; in some cases it is necessary to locate connections on the rear of the module due to panel space limitations. If systems are contemplated that require use of rear panel connections to any great extent, the user may find it convenient to leave open gaps between installed bins for convenience in making front-to-rear connections.

4. OPERATING INSTRUCTIONS

4.1. CONTROL PANEL FUNCTIONS

ON-OFF Switch interrupts both sides of the input power line.

POWER Pilot lamp indicates that ac input power is being supplied to the power transformer primary. Either a blown fuse or a temperature cutout will extinguish this lamp.

TEMP Warning pilot lamp is illuminated if the power supply temperature rises to within ~20°C of the maximum safe operating temperature. When the maximum safe temperature is reached, an internal cutout in the power supply removes power and neither lamp will be illuminated.

TEST JACKS Located on the panel; allow convenient checking of the power supply voltages from the front panel without disassembly of the supply.

4.2. POWER SUPPLY LIMITATIONS

The available current at each voltage is dependent on the power supply. Since the requirements of DOE/ER-0457T have been changed from time to time, the actual capability of any given power supply will depend on its date of manufacture. The instruction manual for the particular power supply in use should be consulted.

The power requirements of individual modules are stated on their front panels. The user should verify that the power supply capability is not exceeded in any given system in one bin.

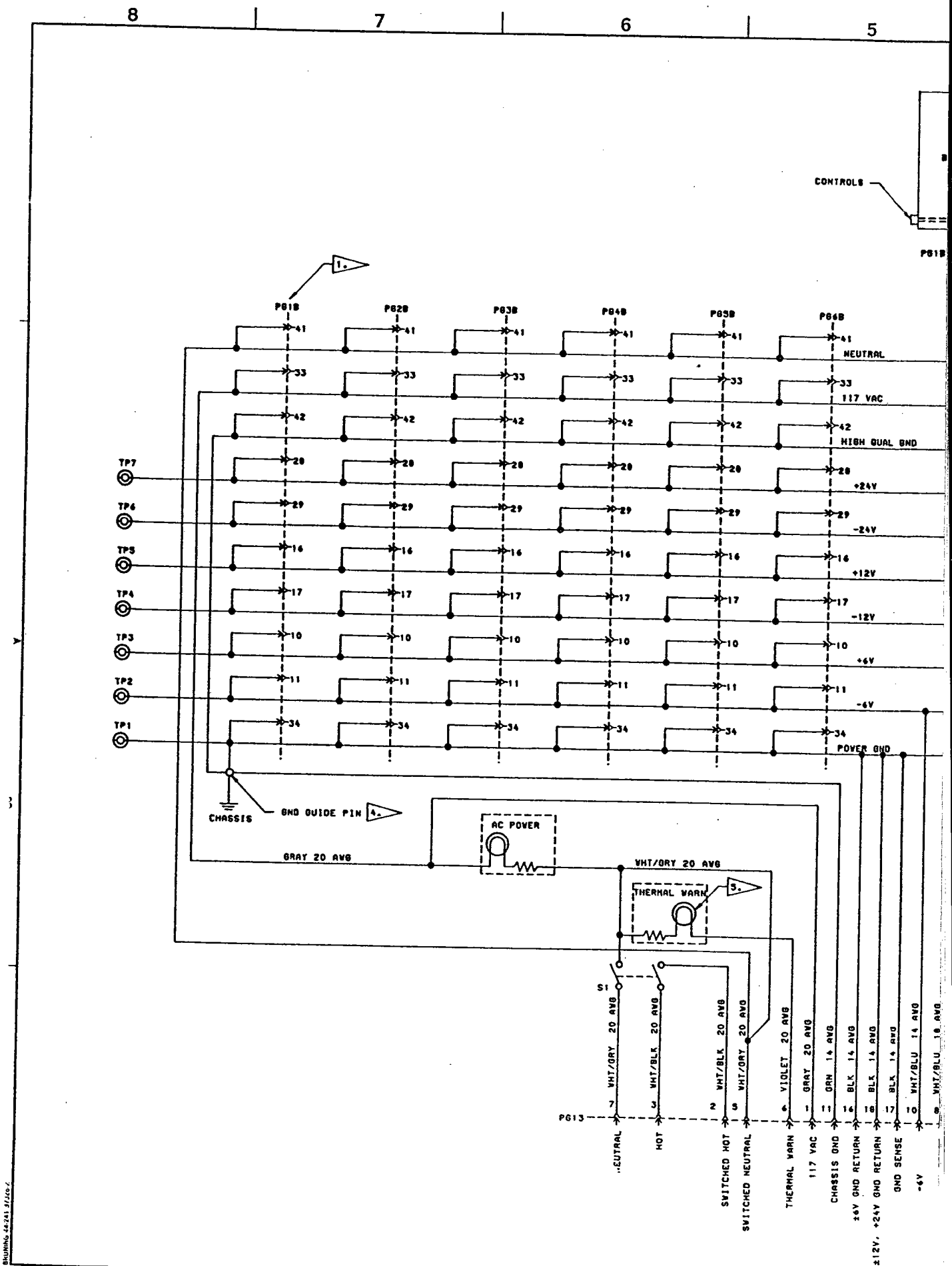
4.3. INSERTION AND REMOVAL OF MODULES

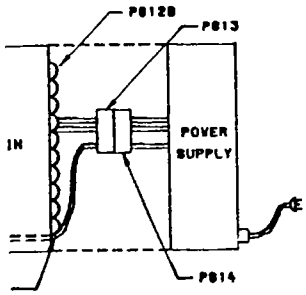
No damage will result to the power supply from insertion or removal of modules while power is on. However, since the sequence of power application to a module is indeterminate when inserted with bin power on, it is prudent to turn off the bin power when modules are being changed or inserted.

Bin/Module Connector Pin Assignments For Standard Nuclear Instrument Modules per DOE/ER-0457T.

Pin	Function	Pin	Function
1	+3 V	23	Reserved
2	- 3 V	24	Reserved
3	Spare bus	25	Reserved
4	Reserved bus	26	Spare
5	Coaxial	27	Spare
6	Coaxial	*28	+24 V
7	Coaxial	*29	- 24 V
8	200 V dc	30	Spare bus
9	Spare	31	Spare
*10	+6 V	32	Spare
*11	- 6 V	*33	117 V ac (hot)
12	Reserved bus	*34	Power return ground
13	Spare	35	Reset (Scaler)
14	Spare	36	Gate
15	Reserved	37	Reset (Auxiliary)
*16	+12 V	38	Coaxial
*17	- 12 V	39	Coaxial
18	Spare bus	40	Coaxial
19	Reserved bus	*41	117 V ac (neutral)
20	Spare	*42	High-quality ground
21	Spare	G	Ground guide pin
22	Reserved		

Pins marked (*) are installed and wired in ORTEC's 4001A and 4001C Modular System Bins.

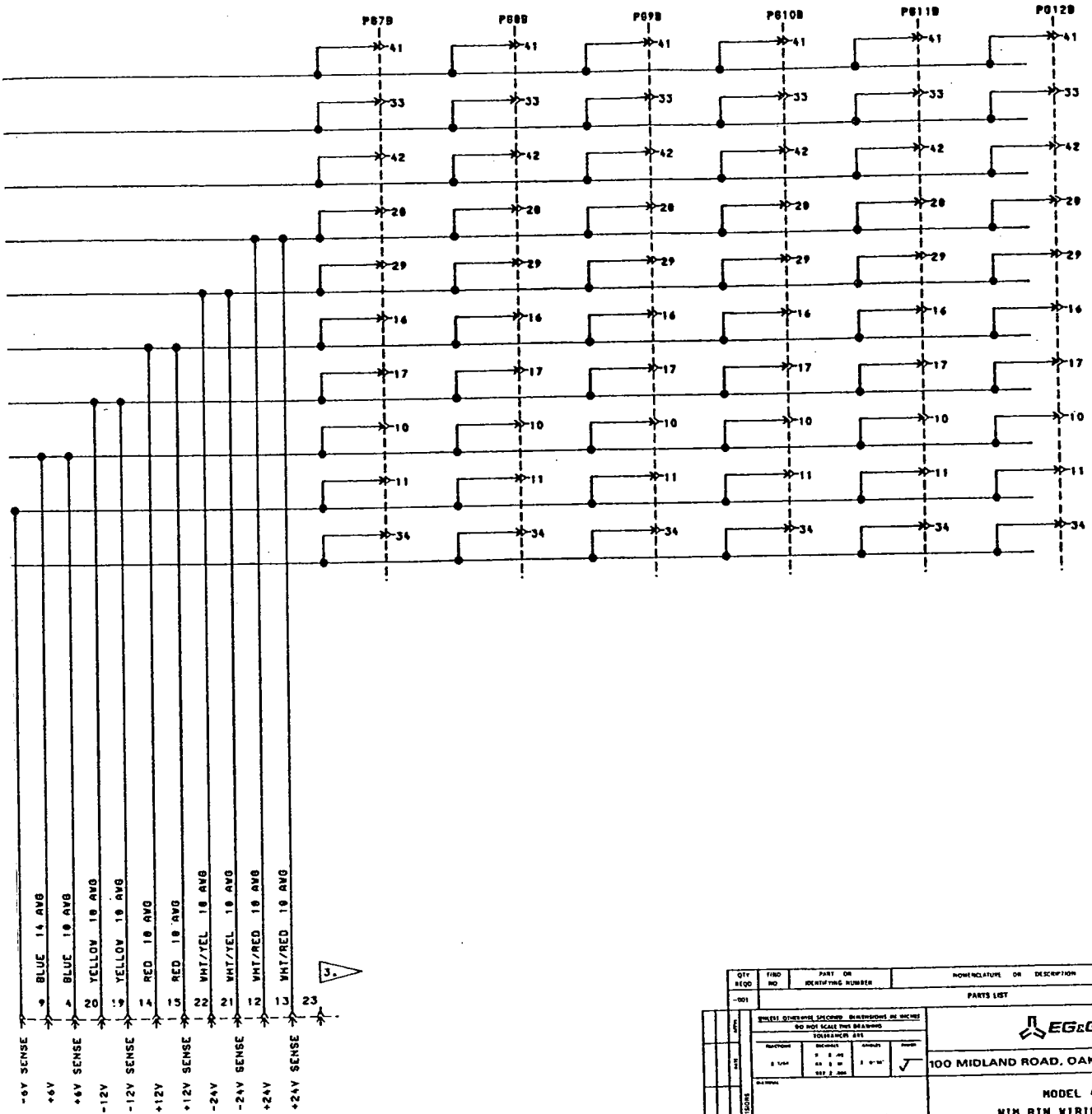

8
7
6
5
CONTROLS
PG1B
1.
PG1B
PG2B
PG3B
PG4B
PG5B
PG6B
NEUTRAL
117 VAC
HIGH QUAL GND
+24V
-24V
+12V
-12V
+6V
-6V
POWER GND
TP7
TP6
TP5
TP4
TP3
TP2
TP1
CHASSIS
GND GUIDE PIN
4.
AC POWER
GRAY 20 AWG
WHT/GRY 20 AWG
THERMAL WARN
5.
S1
WHT/GRY 20 AWG
WHT/BLK 20 AWG
WHT/BLK 20 AWG
WHT/GRY 20 AWG
VIOLET 20 AWG
GRAY 20 AWG
GRN 14 AWG
BLK 14 AWG
BLK 14 AWG
BLK 14 AWG
WHT/BLU 14 AWG
WHT/BLU 18 AWG
PG13
NEUTRAL
HOT
SWITCHED HOT
SWITCHED NEUTRAL
THERMAL WARN
117 VAC
CHASSIS GND
±6V GND RETURN
±12V, +24V GND RETURN
GND SENSE
-6V



TOP VIEW

NOTES UNLESS OTHERWISE SPECIFIED

1. P81B - P812B ARE BIN CONNECTORS (SEE ND-314 & ND-319) WITH P81B ON RIGHT WHEN BIN IS VIEWED FROM FRONT.
2. COPPER BUS BARS EQUIVALENT TO 10 AWG WIRE ARE USED TO DISTRIBUTE ±24, ±12, ±6, AND POWER GND
3. POLARIZING PIN IN POSITION #23 OF P813.
4. CONNECTIONS BETWEEN THE HIGH QUALITY GND BUS (PIN 42), THE POWER RETURN GND BUS (PIN 34), THE CHASSIS GND (PIN 11 OF P813), AND THE CHASSIS ARE MADE AT THE GND GUIDE PIN (SEE ND319) OF P81B. BY BREAKING THESE CONNECTIONS THE GNDS MAY BE ISOLATED IN ANY COMBINATION AS DESIRED.
5. WHEN THERMAL CUTOUT OPERATES: AC POWER WILL BE REMOVED FROM POWER TRANSFORMER & AC POWER LAMP.
6. THE FOLLOWING ARE LOCATED ON THE FRONT PANEL: TP1-7, S1, THE THERMAL WARNING LIGHT, AND THE AC POWER LIGHT.



QTY REQD	FIND NO	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	REMARKS
-001			PARTS LIST	

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES
DO NOT SCALE THIS DRAWING
TOLERANCES ARE

EG&G ORTEC
100 MIDLAND ROAD, OAK RIDGE, TENNESSEE 37830

MODEL 4001C
NIM BIN WIRING DIAGRAM

DRAWN J. SANDERS 2-10-92
APPROVED 2/92
SIZE B1-17AB
DRAWN KEC 2-18-92
SCALE NONE
DRAWING NO 679010
SHEET 1 OF 1

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