

ORTEC

INCORPORATED

AN  EG&G COMPANY

ELECTRONICA

SERVICE ✓

Models 401A and 401B

Modular System Bins

and Model 402H

Power Supply

Operating and Service Manual

ORTEC

Models 401A and 401B Modular System Bins and Model 402H Power Supply

Operating and Service Manual

This manual applies to instruments

401A "Rev 27" (on rear panel)
401B "Rev 03" (on rear panel)
402H "Rev 14" (on rear panel)

STANDARD WARRANTY FOR ORTEC INSTRUMENTS

ORTEC warrants its instruments other than preamplifier FET input transistors, vacuum tubes, fuses, and batteries to be free from defects in workmanship and materials for a period of twelve months from date of shipment provided that the equipment has been used in a proper manner and not subjected to abuse. Repairs or replacement, at ORTEC option, will be made on in-warranty instruments, without charge, at the ORTEC factory. Shipping expense will be to the account of the customer except in cases of defects discovered upon initial operation. Warranties of vacuum tubes and semiconductors made by their manufacturers will be extended to ORTEC customers only to the extent of the manufacturers' liability to ORTEC. Specially selected vacuum tubes or semiconductors cannot be warranted. ORTEC reserves the right to modify the design of its products without incurring responsibility for modification of previously manufactured units. Since installation conditions are beyond the company's control, ORTEC does not assume any risks or liabilities associated with methods of installation or with installation results.

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 or by telephone [(615) 482-4411], 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 nearest 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 will be repaired at the standard charge unless they have been grossly misused or mishandled, in which case the user will be notified prior to the repair being done. A quotation will be sent with the notification.

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.

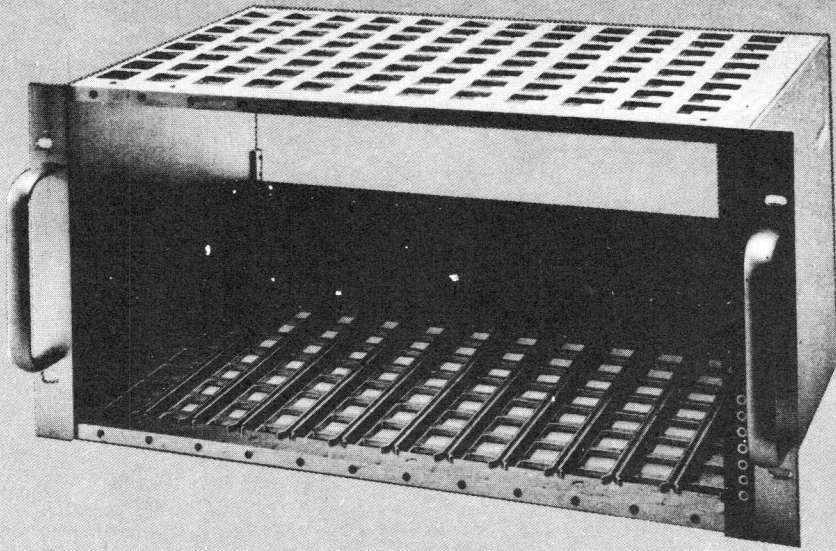
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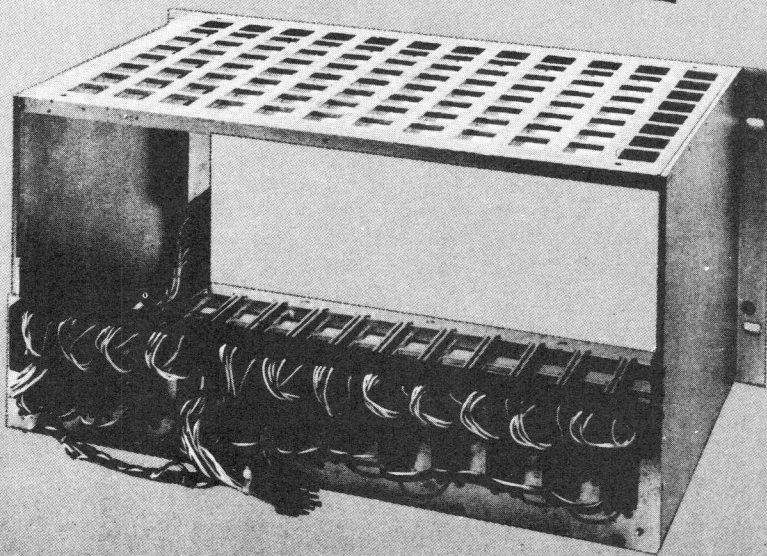
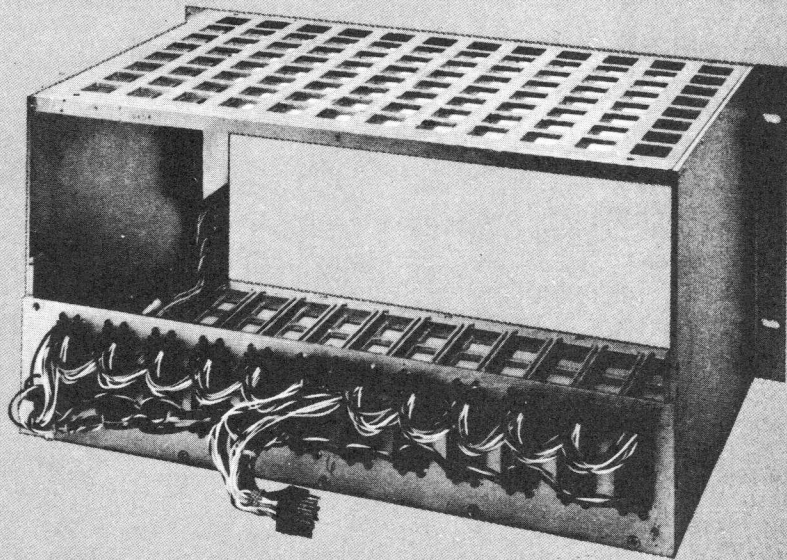
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401A or 401B

401A



401B

ORTEC 401A AND 401B MODULAR SYSTEM BIN

1. DESCRIPTION

1.1. AEC STANDARD MODULE PROGRAM

The ORTEC 401A(B) Modular System Bin conforms to the recommended standards of AEC Report TID-20893 (Rev.), "Standard Nuclear Instrument Modules." This report, the work of a committee of equipment users from AEC-related institutions, 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 standards currently specify power supply voltages of plus and minus 6, 12, and 24 V dc and of 115 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 TID-20893 (Rev.) and addenda for current requirements. Also, since power supplies of earlier manufacture conformed to earlier versions of the standards, the user should familiarize himself with the specifications of the particular supply in use to determine the available current at each voltage.

Twelve basic module widths of 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, 8¾ in. and 5¼ 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. Therefore the TID-20893 (Rev.) standard bins will mount in standard relay racks along with other rack-mounted equipment.

The TID-20893 (Rev.) 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 TID-20893 (Rev.), 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 TID-20893 (Rev.) are designed for insertion and operation in a 401A(B) Bin with an attached mating power supply. In addition to meeting the basic requirements of TID-20893 (Rev.), each ORTEC module also provides two additional compatibility features:

1. Where applicable, the standard linear and logic signal parameters of the Preferred Practices of TID-20893 (Rev.) are used, providing compatible interconnections between instruments.
2. The power supply demand of any given ORTEC module is 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. Any system of ORTEC modules will automatically be compatible with the available Bin power.

These ORTEC instrument modules are made only in the 8¾-in.-high standard module package. The panel space requirements of this type of research instrumentation have precluded the use of the smaller 5¼-in. standard height.

1.3. ORTEC 401A(B) MODULAR SYSTEM BIN

The ORTEC 401A Modular System Bin provides mounting space for 12 standard module widths of the 8¾-in.-high type. The 12 corresponding module connectors are provided, with necessary wiring for distribution of all of the standard power supply voltages. The ORTEC 401B Bin is identical except that the standard power supply voltages are distributed to the module connectors through bus bars instead of wires. These power distribution circuits terminate in the standard connector prescribed by TID-20893 (Rev.) 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 the dc level test points, a control switch, and indicator lamps for the power supply. Further description of the 401A(B) Bin is given in the remaining sections of this manual.

1.4. POWER SUPPLY CONSIDERATIONS

The power supply provisions of TID-20893 (Rev.) 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 TID-20893 (Rev.) standards.

The ORTEC 402A or 402H Power Supply, which conforms to the requirements of TID-20893 (Rev.) in force at time of manufacture, is usually furnished with the 401A(B) Bin. Please refer to the instruction manual provided with each Power Supply.

2. SPECIFICATIONS

MECHANICAL TOLERANCES In accordance with TID-20893 (Rev.) provide for interchangeability of all standard modules.

PANEL DIMENSIONS Standard Relay Rack, 8 $\frac{3}{4}$ in. high, 19 in. wide.

DEPTH BEHIND PANEL Without Power Supply, 10.5 in. (26.6 cm); with 402A Power Supply, 16.0 in. (40.6 cm); with 402H Power Supply, 18.0 in. (45.7 cm).

MODULE CONNECTORS 12 each connectors as specified by TID-20893 (Rev.).

INSTALLED WIRING All connectors of the 401A are wired in parallel for +6 V, -6 V, +12 V, -12 V, +24 V, -24 V, high-quality power return and 115 V ac, in

accordance with TID-20893 (Rev.) pin assignments, with interface connector furnished for connection to power supply as required by TID-20893 (Rev.). The 401B is equipped with laminated 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 Extruded aluminum side members. Die-cast aluminum top and bottom members containing module guides and cadmium-plated steel rear connector plate. Iridite or cadmium finished, with convenience handles on front panel mounting members.

WEIGHT 28 lb net with 402A Power Supply; shipping weight 35 lb; 36 lb net with 402H Power Supply; shipping weight 43 lb.

3. INSTALLATION INSTRUCTIONS

3.1. POWER SUPPLY INPUT VOLTAGE

The ORTEC 402A or 402H Power Supply that usually accompanies the 401A(B) Bin may be used on either 115 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, labeled as to voltage choice. The Power Supply will be shipped with the voltage set according to the customer's order instructions. 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 115-V input power, a direct connection provides the 115-V ac

power to the assigned pins in the module connectors and the amount of 115-V power available is limited only by the fuse. However, when input power is 230 V, the 115-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 installed 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 401A(B) 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 TID-20893 (Rev.) 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 rise.

The use of cooling fans in equipment cabinets will reduce the operating temperature of the enclosed equipment. How-

ever, it will also invariably couple the circuits involved more tightly to the temperature variations of the environment. In systems installations 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 to the greatest extent possible. In some cases secondary connections are located on the rear of the module when necessary, 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 $\sim 20^{\circ}\text{C}$ 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 TID-20893 (Rev.)

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. Note that a system composed entirely of ORTEC modules will not require this verification, since each ORTEC module uses no more power than its proportional share based on panel space occupancy in the 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.

5. CIRCUIT DESCRIPTION

The Bin circuit consists only of passive power distribution wiring. The accompanying wiring diagram provides full information on the wiring.

Power Supply circuit information is contained in the 402A or 402H Power Supply instruction manual immediately following the Bin wiring diagram.

Note the provisions of two "ground" connections in the module connector. Pin 42 is a "high quality ground," and Pin 34 is the "power return ground." The intent is that the high quality ground normally carry negligible current and serve as the reference ground in sensing circuits.

The pins in the module are assigned according to a schedule. Refer to TID-20893 (Rev.) for details on pin assignments.

6. MAINTENANCE INSTRUCTIONS

Because of the passive nature of the Bin wiring, maintenance will probably be limited to the addition or removal of wiring. To retain the interchangeability features of the TID-20893 (Rev.) standards, all wiring changes or additions should be done with careful reference to the standard pin assignment schedule, a synopsis of which is given in the figure and table on page 13.

The connector pins specified for use with the standard bins attach to wires by means of a crimped joint. A hand crimping tool is required for this purpose, and is used after the contacts have been pushed into place in the connector block. Removal of a contact also requires the use of a special tool, called a pin-socket extractor.

Assembly details for the connectors and blocks are shown in ORTEC drawing 401-0002, included in this manual. Note that there are two alternate manufacturing sources for the component parts: AMP, Inc., of Harrisburg, Pennsylvania, and Winchester Electronics of Oakville, Connecticut. Each source also provides a hand-crimping tool and a pin-socket extractor. The proper tool for each application must be selected from the same manufacturing source as the connector block and connectors in order to ensure compatibility.

As listed in the details in drawing 401-0002, the AMP connector block for bin mounting is their #202516-3 and is

blue. The equivalent Winchester block is WIN 111-20854 and is orange. The connector block that is mounted on a module that is designed for insertion into the bin can have either an AMP 204186-5 (green) or a WIN 111-20853 (gray) identification.

The hand-crimping tool for use with AMP products is an AMP 90067, which is ORTEC part number 9097-65313. The hand-crimping tool for use with Winchester products is their part 107-0903-2A.

The AMP pin-socket extractor is their part number 305183, ORTEC part number 42947. The Winchester pin-socket extractor is their 107-1015, ORTEC part number 44694.

Either of these tools can be obtained from an authorized distributor of AMP or Winchester parts, respectively, or directly from the manufacturer. They may also be ordered from ORTEC.

The connector pins that are used in the bin and modules are available in several types. Consult TID-20893 and its referenced drawings for suitable types. Additional related information is included in Tables 1, 2, and 3 on ORTEC drawing 401-0002.

APPENDIX

REPLACEABLE PARTS

ORDERING INFORMATION

The Replaceable Parts List shown below contains information needed for ordering spare and/or replacement parts. Each listing indicates the reference designator number, the part number, a description of the component, and the part manufacturer and manufacturer's part number.

All inquiries concerning spare and/or replacement parts and all orders for same should include the model serial, and revision ("Rev" on rear panel) numbers of the instruments involved and should be addressed to the Customer Service Department at 100 Midland Road, Oak Ridge, Tennessee 37830. The Manager of Customer Services can be reached

by telephone at (615) 482-4411. The minimum order for spare and/or replacement parts is \$25.00.

ORDERING INFORMATION
FOR PARTS NOT LISTED

In order to facilitate the ordering of a part not listed below, the following information should be submitted to the Customer Service Department:

1. the instrument model number,
2. the instrument serial number,
3. revision ("Rev" on rear panel) number,
4. a description of the part,
5. information as to the function and location of the part.

The solid-state-device (diodes, transistors, and integrated circuits) types installed in your instrument may differ from those shown in the schematic diagram and parts list. In such cases, necessary replacements can be made with either the type shown or the type actually installed in the instrument.

Replaceable Parts List

REFERENCE DESIGNATOR	ORTEC PART NO.	DESCRIPTION	MFR.	MFR. PART NO.
401A-0500	3001 04011			
14	9097 42941	Female Bin Block	81312	#111-20854
15	9097 42942	Harness Block (PG-13)	81312	#111-20859
16	9097 42936	Guide Pin (Bin)	81312	#111-20855
17	9097 42932	Guide Socket (Bin)	81312	#111-20858
18	9097 44696	Contact Socket (Bin)	81312	#100-0820S
19	9097 42943	Contact Socket (Bin)	81312	#100-0817S
20	9097 44695	Contact Pin (PG-13)	81312	#100-0815P
21	9103 41374	Pilot Lamp Assembly	91802	#2150A1
22	9094 41278	Switch, Toggle, DPDT	95146	#MST205-N
30	9097 42937	Guide Socket (Bin)	81312	#111-20856
39	9097 42939	Contact Pin (PG-13)	81312	WIN #100-0812P
40	7180 64835	Terminal Board	ORTEC	401A-0122
C1	9065 40948	6.8 uf 20% 35V Tan.	80183	SPR #150D685X0035B2
C2	9065 40948	6.8 uf 20% 35V Tan.	80183	SPR #150D685X0035B2
C3	9065 40948	6.8 uf 20% 35V Tan.	80183	SPR #150D685X0035B2
C4	9065 40948	6.8 uf 20% 35V Tan.	80183	SPR #150D685X0035B2
C5	9065 40948	6.8 uf 20% 35V Tan.	80183	SPR #150D685X0035B2
C6	9065 40948	6.8 uf 20% 35V Tan.	80183	SPR #150D685X0035B2