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**INSTRUCTION
MANUAL
401A-402A
BIN &
POWER SUPPLY**

AN  **EG&G** COMPANY

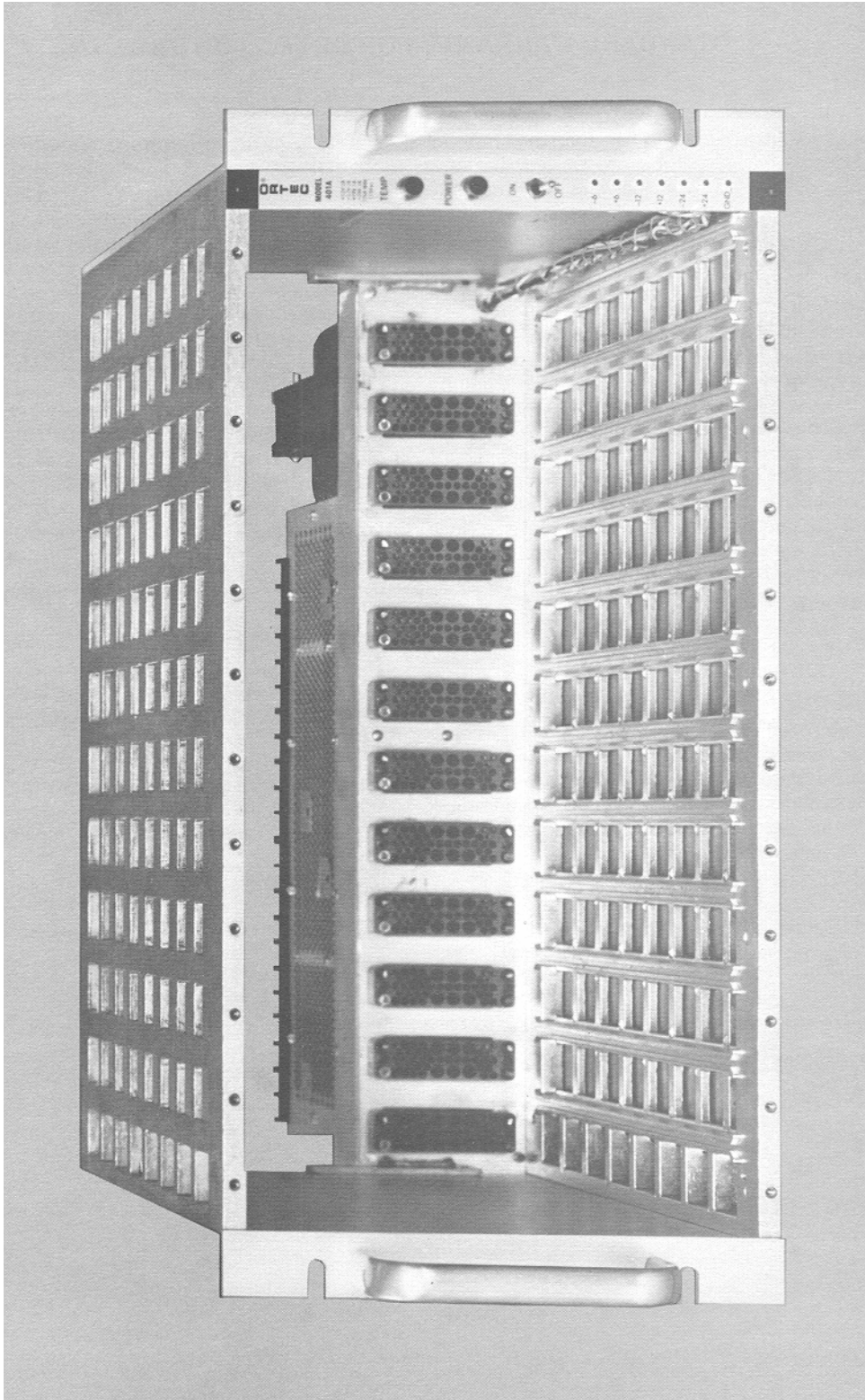
401A MODULAR SYSTEM BIN

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ORTEC 401A MODULAR SYSTEM BIN

1. DESCRIPTION

1.1 AEC Standard Module Program

The ORTEC 401A Modular System Bin conforms to the recommended standards of AEC Report TID-20893 (Rev.), January 1968, "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 allowing electrical and mechanical interchangeability of units made in conformance with the standards. The standards prescribe the necessary mechanical dimensions and connector types to insure mechanical interchangeability. They also specify standard power supply voltages and pin assignments in the connector, so that electrical interchangeability is assured at least with respect to the main connector joining module to bin.

The standard currently provides power supply voltages of plus and minus 6, 12, and 24 V dc and 115 V ac delivered to assigned module connector pins. The specified current available to each pin has undergone some change with successive issues of the standard. Reference should be made 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 standard, the user should familiarize himself with the specifications of the particular supply in use as to 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 standard module and bin heights are provided by the standard, 8 $\frac{3}{4}$ in. and 5 $\frac{1}{4}$ in. These standard heights as well as the basic external mounting dimensions of the bin conform to the established ASA standard 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. Therefore, 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 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:

- a. Where applicable, the standard linear and logic signal parameters of the Preferred Practices of TID-20893 (Rev.) are used, providing compatible interconnections between instruments.
- b. 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 8 $\frac{3}{4}$ -in. height standard module package. The panel space requirements of this type of research instrumentation have precluded the use of the smaller 5 $\frac{1}{4}$ -in. standard height.

1.3 ORTEC 401A Modular System Bin

The ORTEC 401A Modular System Bin provides mounting space for 12 standard module widths of the 8 $\frac{3}{4}$ -in. height type. The 12 corresponding module connectors are provided, with necessary wiring for distribution of all of the standard power supply voltages. 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 control switches and indicator lamps for the power supply. Further description of the 401A Bin is found 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 Power Supply, which conforms to the requirements of TID-20893 (Rev.) in force at time of manufacture, is usually furnished with the 401A Bin. Please refer to the instruction manual provided with each 402A Power Supply.

2. SPECIFICATIONS

Mechanical Tolerances In accordance with TID-20893 (Rev.), providing 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. (25.4 cm); With Power Supply, 16.0 in. (38.1 cm)

Module Connectors 12 each. Connectors as specified by TID-20893 (Rev.)

Installed Wiring All connectors 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.)

Construction Extruded aluminum side members. Diecase 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.

Dimensions Standard Panel 19 in. wide x 8.719 in. high, 16 in. depth behind panel including power supply. ORTEC 402A Power Supply mounts on rear of the 401A.

Weight 27 lb, with 402A Power Supply, shipping weight 35 lb.

3. INSTALLATION INSTRUCTIONS

3.1 Power Supply Input Voltage

The ORTEC 402A Power Supply that usually accompanies the 401A 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 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 the supply on 230 V.

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 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 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. However, 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 approximately 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 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 during the course of its existence, the actual capability of any given supply will depend on its date of manufacture. The instruction manual for the particular supply in use should be consulted.

In recent units, the power supply capability is stated on the front control panel, and 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 the bin power OFF when changing or inserting modules.

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 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. Please 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 following this page.

The connector pins specified for use with the standard bins

attach to wires by means of a crimped joint. For small volume hand assembly of connections, a Hand Crimping Tool, AMP 90067, is suggested. The contacts are installed in the connector block merely by pushing into place. Removal of a contact requires the use of a special tool, AMP Contact Removal Tool 305183. Either of the above mentioned tools can be obtained from distributors of AMP connector products, from AMP Incorporated in Harrisburg, Pennsylvania, or from ORTEC. The connector pins used in the bin and the modules are available in several types. Please consult TID-20893 (Rev.) and its referenced drawings for suitable types.

**BIN/MODULE CONNECTOR PIN ASSIGNMENTS
FOR AEC STANDARD NUCLEAR INSTRUMENT MODULES
PER TID-20893**

| Pin | Function | Pin | Function |
|-----|--------------|-----|----------------------|
| 1 | +3 volts | 23 | Reserved |
| 2 | - 3 volts | 24 | Reserved |
| 3 | Spare Bus | 25 | Reserved |
| 4 | Reserved Bus | 26 | Spare |
| 5 | Coaxial | 27 | Spare |
| 6 | Coaxial | *28 | +24 volts |
| 7 | Coaxial | *29 | - 24 volts |
| 8 | 200 volts dc | 30 | Spare Bus |
| 9 | Spare | 31 | Carry No. 2 |
| *10 | +6 volts | 32 | Spare |
| *11 | - 6 volts | *33 | 115 volts ac (Hot) |
| 12 | Reserved Bus | *34 | Power Return Ground |
| 13 | Carry No. 1 | 35 | Reset |
| 14 | Spare | 36 | Gate |
| 15 | Reserved | 37 | Spare |
| *16 | +12 volts | 38 | Coaxial |
| *17 | - 12 volts | 39 | Coaxial |
| 18 | Spare Bus | 40 | Coaxial |
| 19 | Reserved Bus | *41 | 115 volts ac (Neut.) |
| 20 | Spare | *42 | High Quality Ground |
| 21 | Spare | G | Ground Guide Pin |
| 22 | Reserved | | |

**These pins are installed and wired in parallel in the ORTEC 401A Modular System Bin.*