

INSTRUCTION MANUAL

401A-402A

BIN & POWER SUPPLY

Serial No. _____

Purchaser _____

Date Issued _____

ORTEC
INCORPORATED

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AN  **EG&G** COMPANY

401A MODULAR SYSTEM BIN

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A NEW STANDARD TWO-YEAR WARRANTY FOR ORTEC ELECTRONIC INSTRUMENTS

ORTEC warrants its nuclear instrument products to be free from defects in workmanship and materials, other than vacuum tubes and semiconductors, for a period of twenty-four 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 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, as made by their manufacturers, will be extended to our 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 our control, ORTEC does not assume any risks or liabilities associated with methods of installation other than specified in the instructions, or installation results.

QUALITY CONTROL

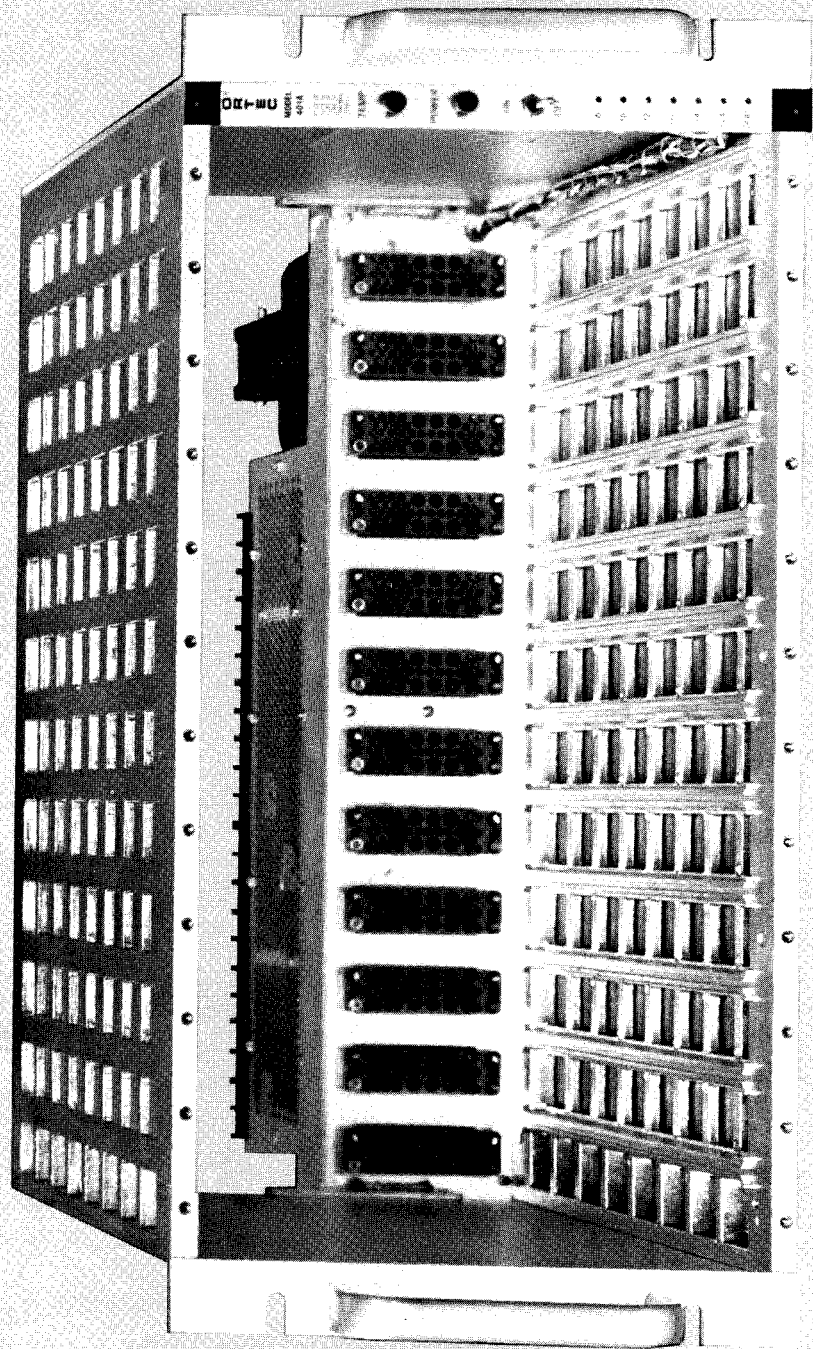
Before being approved for shipment, each ORTEC instrument must pass a stringent set of quality control tests designed to expose any flaws in materials or workmanship. Permanent records of these tests are maintained for use in warranty repair and as a source of statistical information for design improvements.

REPAIR SERVICE

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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 we may assist in damage claims and in providing replacement equipment if necessary.



STOP

MODEL

4074

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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

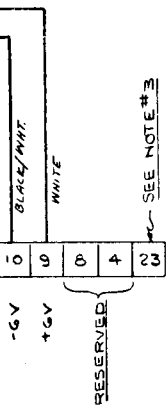
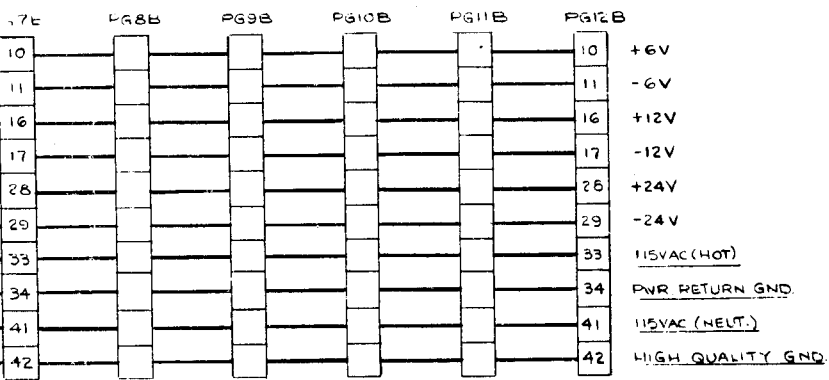
attach to wires by means of a crimped joint. For small volume hand assembly of connections, a Hand Crimping Tool, AMP 90067, is suggested. The contacts are installed in the connector block merely by pushing into place. Removal of a contact requires the use of a special tool, AMP Contact Removal Tool 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.*

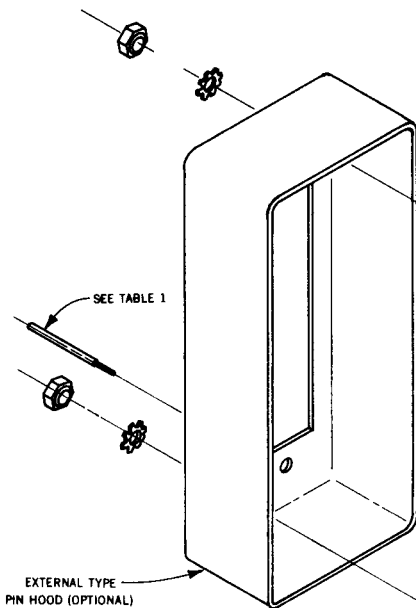
The transistor types installed in your instrument may differ from those shown in the schematic diagram. In such cases, necessary replacements can be made with either the type shown in the diagram or the type actually used in the instrument.



NOTES:

1. PG1B - PG12B ARE BIN CONNECTORS (SEE NC-514 & ND-519) WITH PG1B ON RIGHT WHEN BIN IS VIEWED FROM FRONT.
2. PG13 IS AMP20-650-2 WITH PINS AS PER ND-519. MATES WITH PG14 ON POWER SUPPLY.
3. POLARIZING PIN IN POSITION #23 OF PG13.
4. CONNECTIONS BETWEEN THE HIGH QUALITY GND. BUSS (PIN 42), THE POWER RETURN GND BUSS (PIN 34), THE CHASSIS GND. (PIN 11 OF PG13), AND THE CHASSIS ARE MADE AT THE GND. GUIDE PIN (SEE ND-519) OF PG1B. BY BREAKING THESE CONNECTIONS THE GNDS MAY BE ISOLATED IN ANY COMBINATION AS DESIRED.
5. UNLESS SPECIFIED: ALL WIRE #10 STRANDED.
6. WHEN THERMAL CUTOFF OPERATES AC POWER WILL BE REMOVED FROM PWR. TRANSFORMER & AC POWER LAMP.

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES TOLERANCES FRACTION ± _____ DECIMALS ± _____ ANGLES ± _____ SURFACE FINISH ✓ RMS APPLIED PRACTICES				ORTEC OAK RIDGE TECHNICAL ENTERPRISES CORPORATION OAK RIDGE, TENNESSEE	
TITLE MODEL 401ABIN WIRING DIAGRAM		DRFTSMAN HW		DATE 11-14-66	
REVISIONS B 401A-45-0 JDM A 401A-1 5-7 JDM		ENG APPROVAL [Signature]		RESP. ENG. D RAMSEY	
RLV. ECN. NO. DATE BY APPD.		DATE 11-14-66		DRAWING NO. 401A-0100-31	
SCALE		DWG. NO.		DATE 11-17-66	



EXTERNAL TYPE
PIN HOOD (OPTIONAL)
201390-5
ORTEC # 41739
SEE NOTE 1
WIN-111-20852
ORTEC 42944

ORTEC #46244 IS A STANDARD PUT-UP OF TEN EACH 8 INCH #20 AWG WITH #41357 (AMP PIN CONTACT 66104-1.) WIRE COLORS: BLACK, BROWN, RED, ORANGE, GREEN, BLUE, GRAY, VIOLET, VIOLET/WHITE, WHITE. SPECIAL ORDERS PER TABLE 1 OR TABLE 2

-TABLE 1- AMP SOCKET AND PIN CONTACTS				
SOCKET CONTACT		PIN CONTACT		FOR WIRE SIZE
AMP NO.	ORTEC NO.	AMP NO.	ORTEC NO.	(AWG) *
66358-1	42433	66359-1	42434	1 #14 OR 2 #18
66100-1	41360	66098-1	41349	1 #16, 1 #18 OR 2#20
66104-1	41357	66102-1	41355	1 #20 OR 2 #22
66108-1	SPECIAL	66106-1	SPECIAL	1 #24 OR 2 #26

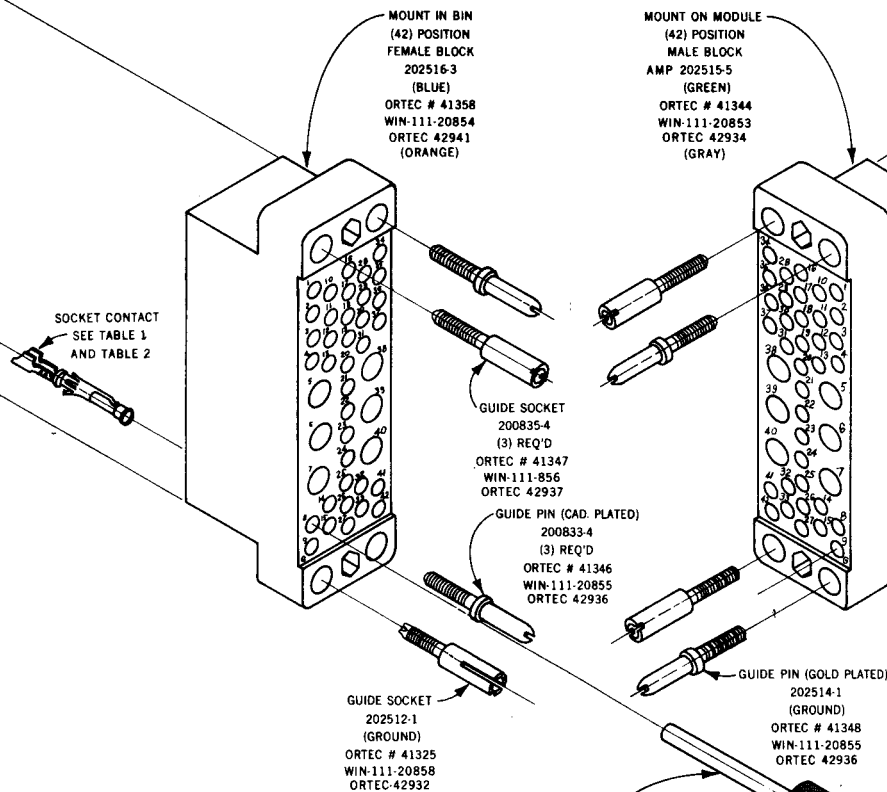
*ALL WIRE TEFLON INSULATED TYPE EE EXCEPT #18 GA TYPE E.

XXXXX-X#XX-XXX-XX/XX

ORTEC NO. (PIN OR SOCKET)	NO. WIRE GAGE	LENGTH (INCHES)	COLOR(S)
			1-BROWN
			2-RED
			3-ORANGE
			4-YELLOW
			5-GREEN
			6-BLUE
			7-VIOLET
			8-GRAY
			9-WHITE
			10-BLACK

EXAMPLE: SOCKET CONTACT FOR 2 #22 WIRES,
10 INCHES LONG, COLORS, ONE RED,
ONE BLACK, 41357-2#22-10-2/10

ORTEC
600007



- NOTES: 1. PIN HOODS ARE OPTIONAL PARTS. IF
PIN HOOD IS NOT USED 1/32 (.032)
THICK SPACERS MUST BE SUBSTITUTED
(4 PLACES.)
2. PIN-SOCKET EXTRACTOR NECESSARY TO
REMOVE CONTACTS FROM ALL BLOCKS.

TABLE 2 WINCHESTER SOCKET AND PIN CONTACTS				
SOCKET CONTACT		PIN CONTACT		FOR WIRE SIZE
WIN. NO.	ORTEC NO.	WIN. NO.	ORTEC NO.	AWG
100-08165	42940	100-0811P	42938	1#14,2#20
100-08175	42943	100-0812P	42939	1#16,1#18 OR 1#20 OR 2#22
100-08205	44696	100-0815P	44695	2#18

402A POWER SUPPLY

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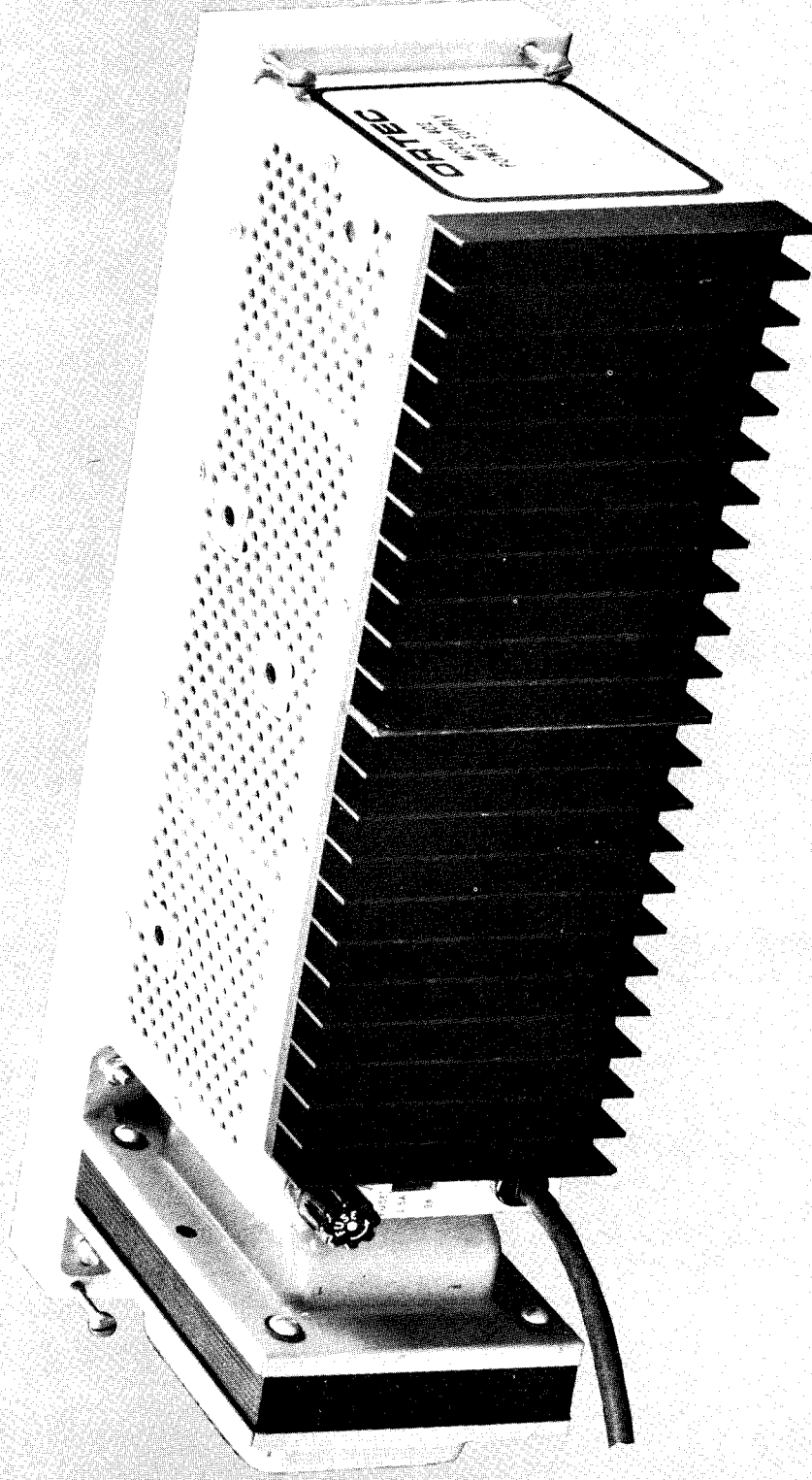
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ORTEC 402A POWER SUPPLY

1. DESCRIPTION

The ORTEC 402A Power Supply is designed to be mounted in the space provided on the rear of the 401A Modular System Bin. The supply was designed to exceed the recommended power supply specifications, Appendix A of TID-20893 (Rev.), Type 1, Class A, adopted by the AEC Committee on Nuclear Instrument Modules.

The 402A was designed for both foreign and domestic usage. Input voltage mains of 115 V ac or 230 V ac, 50-65 Hz, may be used. A convenience indicating switch located on the rear of the supply clearly identifies the intended main to use. The primary circuits are fused and a three conductor NEMA standard power cord is included.

The supply furnishes four standard dc voltages, +12 V at 2 A, -12 V at 2 A, +24 V at 1 A, and -24 V at 1 A, with a maximum power capability of 72 W at 50°C. A high efficiency heat sink allows additional power dissipation (see Specifications). The dc outputs are regulated, short circuit protected, current limited and thermal protected.

The 115 V ac is supplied to the bin connector independent of input mains. The 115-V ac power available is limited only by the power supply fuse when operating from 115-V ac mains. When operating from 230-V ac mains the 115-V ac is derived by auto transformer action and is limited to 50 VA output with a dc load on the power supply of 72 W.

A control panel is provided on the ORTEC 401A Instrument Bin for operating and monitoring the 402A Power Supply. An ON-OFF switch, power indicating lamp, thermal warning lamp and convenience dc monitor jacks are provided. The thermal warning lamp is lighted when the internal temperature rises to within 20°C of the maximum safe operating temperature. The power supply is automatically cut off by an internal switch should the temperature exceed the maximum safe operating temperature.

The power supply regulator amplifiers are located on the two identical plug-in printed circuit boards, which may be interchanged for maintenance purposes. Spare regulator boards are available. The regulating transistors and current monitoring resistors for the current limiting are mounted on a specially designed high efficiency heat sink.

The power transistors are virtually indestructible due to their power handling capability, current limiting, and short circuit protection. All silicon semiconductors, 85°C capacitors with conservative working voltage ratings, high quality carbon and metal film resistors are combined to produce a power supply exceeding the TID-20893 (Rev.) requirements.

The dc output voltages are adjustable over a ± 1 -V range from their nominal ratings through holes in the top of the power supply cover plate. The adjustment potentiometers are 15 turn, precision wire wound for superior adjustment resolution and resetability of the output voltages.

2. SPECIFICATIONS

The specifications for the 402A Bin Power Supply meet or exceed those set forth by the AEC Committee on Nuclear Instrument Modules, TID-20893 (Rev.), Appendix A, Type 1, Class A.

Input 103-129 V ac, 50-65 Hz, or 210-258 V ac, 50-65 Hz. Input current at 115 V is 1.8 A for a 72-W dc output.

DC Output Output at the following ratings +12 V at 2 A, -12 V at 2 A, +24 V at 1 A, -24 V at 1 A, maximum output power to 50°C ambient, 72 VA; operation to 60°C ambient with current derated not more than 3%/°C. Under certain conditions the 72-VA power limitation may be exceeded to a maximum of 96 VA. (See Figure 1.)

115 Volt AC Output 115-V ac output limited only by the supply fuse when operating from 115-V ac mains. Output is limited to 50 VA at 72-VA dc load while operating from 230-V ac mains.

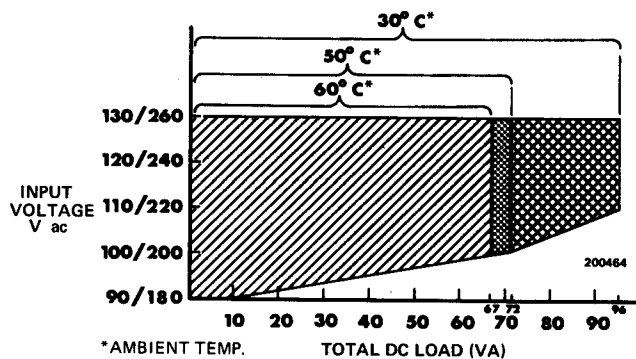


Figure 1. Maximum Safe Operating Range

Regulations $\pm 0.05\%$ over the combined range of zero to full load and input voltage of 103-129 V ac over any 24-hr period at a constant ambient temperature, and rated line and load, after a 60-min warmup.

Stability $\pm 0.3\%$ after a 24-hr warmup at constant line, load, and ambient temperature over a six-month period.

Temperature Coefficient Less than $0.01\%/^{\circ}\text{C}$ over a range of 0°C to 60°C .

Thermal Protection A thermal warning switch closure will occur when the ambient temperature approaches within 20°C of the safe operating temperature. A thermal cutout switch disables the power supply when the temperature exceeds the safe operating temperature.

Noise and Ripple The output noise and ripple is less than 3 mV peak to peak, as observed on a 50-MHz band width oscilloscope.

Voltage Adjustment $\pm 0.5\%$ minimum range, resettability $\pm 0.05\%$ minimum of supply voltage. Typical ± 1 V of specified voltage.

Recovery Time Less than $50 \mu\text{s}$ to return to within $\pm 0.1\%$ of rated voltage for any change in input voltage and load current from 10% to 100% full load.

Circuit Protection The input line to the power supply is fused. In addition, output current limiting to prevent damage to the supply and automatic recovery when the demand is removed are provided by electronic circuitry.

Output Impedance Less than 0.3 ohm at any frequency to 100 kHz.

Output Connector All power and control circuits terminate in a connector, specified by TID-20893 (Rev.), which mates with the bin interface connector, completing the necessary control and power supply wiring.

Dimensions 16.825 in. wide, 3.438 in. high, 5.500 in. deep, conforms to AEC Drawing ND515.

Weight 13 lb net; with 401A Bin 27 lb net. Shipping weight for 401A/402A 35 lb gross.

3. INSTALLATION

The 402A Power Supply is normally supplied factory connected to an ORTEC 401A Modular System Bin. However, the supply is designed to TID-20893 (Rev.) specifications and may be attached, in the space provided, to any Bin manufactured to TID-20893 (Rev.) specifications.

For attachment to other than ORTEC 401A Bin, please refer to the appropriate instruction manual. The ON-OFF switch and other controls necessary to operate the supply are part of the Bin and not furnished with the power supply.

For attachment to ORTEC 401A Bin the following steps are advised:

1. Place the Bin on a table with the back part facing you. Place the power supply in the proper mounting position,

leaving enough space between the two pieces to attach the interface connector.

2. Mate the interface connector, being careful to align the polarizing pins. Fold and form all wiring close to the connector edges to prevent any wires being pinched and producing a short circuit in succeeding steps.

3. Mount the supply to the Bin by securely tightening the four 10-32 screws, being careful not to pinch any wires or to use undue force on any parts.

When attaching the 402A Power Supply to older 401 Bins, it is necessary to first remove the left and right side covers and stand the Bin on its front face (handles down). From this point on assembly is the same, and upon completion the side plates are replaced.

4. OPERATING INSTRUCTIONS

4.1 Power Supply Limitations

The available current from the power supply is specified by TID-20893 (Rev.), Appendix A, Type 1, Class A supply. Under certain conditions these specifications may be exceeded. (See Figure 1.) Care must be used to ensure

natural convection of heat dissipated by the heat sinks and power transformer. For best results, when using at maximum power loadings the bin and power supply should be in an open space, placed upon blocks at least 1 in. off the table mounting surface to allow maximum ventilation. When used in a rack, maximum attention should be paid to placement of other heat generating equipment. Adequate unobstructed space on all sides is necessary for convection ventilation and cooling. If the Bin contains other heat

generating equipment, a blower may be advisable to remove the dissipated heat.

When it is necessary to rack mount several bins and power supplies, especially when other heat generating equipment is located within the rack, the term "ambient temperature" becomes less clearly defined. A better guide to maximum power loading capability is to monitor the heat sink

temperature. In no case allow the heat sink temperature to continuously run above 85°C. Although this is not the maximum operation temperature, any additional temperature rise due to other conditions of the system may force the supply out of tolerance and may cause the supply to automatically shut down operation. Should your operation produce a temperature of 85°C, a blower to remove the dissipated heat is indicated.

5. CIRCUIT DESCRIPTION

The 402A Power Supply produces four dc output voltages. A power transformer transforms the input ac line voltage into four separate low voltage sources. The sources or windings are full wave rectified, capacitor filtered and regulated by electronic series regulator circuits. The regulator circuits provide short circuit, current limiting and reverse current protection.

Each of the four series regulator circuits is identical in operation; they are physically different only in component values for each supply.

The regulator essentially operates in two modes. First and normal is the voltage regulation mode. Second is the constant current or current limiting protection mode.

The regulation will operate in the voltage regulation mode at any current output up to and including the full rated output of a particular supply. When current output beyond the rated output is required, which includes a direct short across the output terminals, the regulator automatically shifts into a constant current mode. This provides current limiting and protection of the regulator's circuitry and components. When excessive current demands are removed the regulator resumes the voltage regulation mode.

For operation of the regulator, please refer to circuit Drawing 402A-1100-S1. For convenience, only the +24-V

regulator will be discussed and the following is an explanation of the regulation in the normal voltage regulation mode.

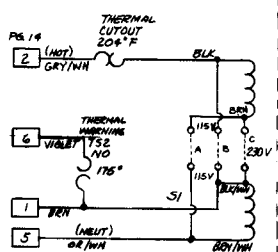
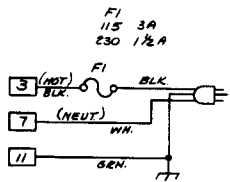
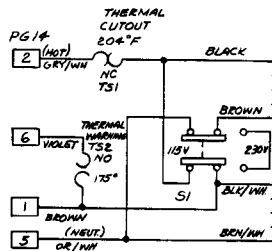
Transistors Q6 and Q7 operate as a differential amplifier pair, comparing the reference voltage of D4 at the base of Q6 with a portion of the output voltage divided down through R16, R17, and R18. R17, a trim potentiometer, is used to adjust the output voltage to the specified level. A difference voltage at the collector of Q7 is dc amplified by Q4 and Q2. The collector of Q2 drives an emitter follower Q1, which supplies the necessary current to drive the remotely located series power transistor. This transistor is heat sink mounted to dissipate the power consumed in the regulation process.

In the constant current or limiting mode, remotely located resistor R1, in series with the output, senses the output current level and produces a proportional voltage rise. The sense voltage is compared to the output voltage at the base of Q5. For output current levels less than or equal to the rated output, Q5 remains back biased and will have no effect on the regulator performance. However, when the output current exceeds the rated output, Q5 becomes forward biased and conducts, causing Q2 to conduct harder, thereby reducing the available base drive current to the emitter follower Q1 and the series pass regulator transistor. As a result, the output voltage is reduced until the output current is within the required limits. Upon removal of the short circuit or excessive current demand the regulator resumes the normal voltage regulation mode.

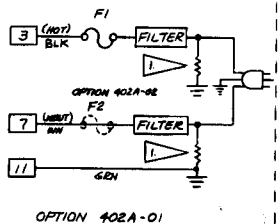
**BIN/MODULE CONNECTOR PIN ASSIGNMENTS
FOR AEC STANDARD NUCLEAR INSTRUMENT MODULES
PER TID-20893**

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.*



FOR	WIRE ONLY
115	A&B
230	C



IF F1/F2 IS 115V, 3A RESISTORS ARE 200K
 IF F1/F2 IS 230V, 1/2A RESISTORS ARE 390K

