

INSTRUCTION MANUAL
446
HIGH VOLTAGE POWER SUPPLY

Serial No. _____

Purchaser _____

Date Issued _____

ORTEC

AN  **EG&G** COMPANY

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TABLE OF CONTENTS

	Page
WARRANTY	
PHOTOGRAPH	
1. DESCRIPTION	1
2. SPECIFICATIONS	1
3. INSTALLATION INSTRUCTIONS	2
3.1 General	2
3.2 Connection to Power	2
3.3 Connecting Into A System	2
4. CORRECTIVE MAINTENANCE	2
446-0101-B1 ORTEC Operational Block Diagram	

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

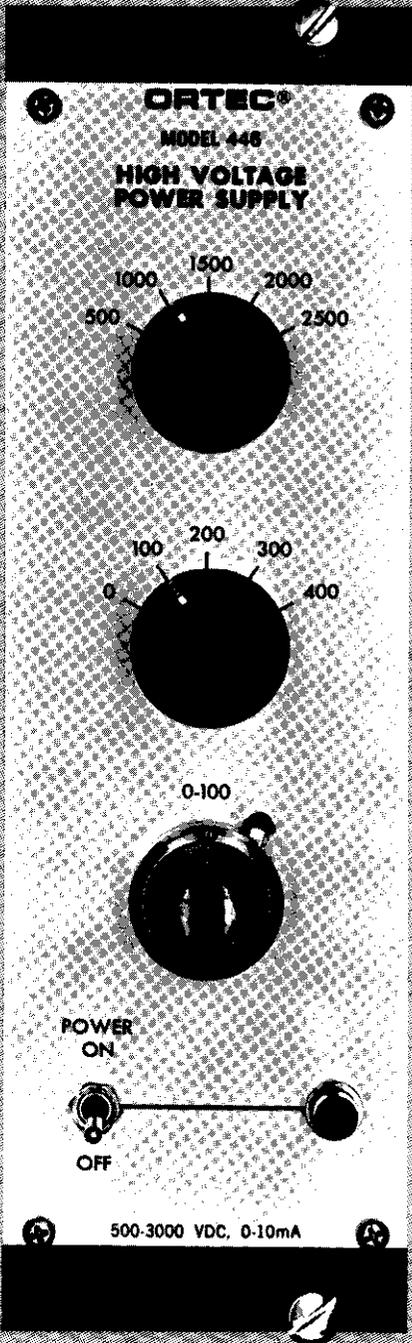
Before being approved for shipment, each ORTEC instrument must pass a stringent set of quality control tests designed to expose any flaws in materials or workmanship. Permanent records of these tests are maintained for use in warranty repair and as a source of statistical information for design improvements.

REPAIR SERVICE

ORTEC instruments not in warranty may be returned to the factory for repairs or checkout at modest expense to the customer. Standard procedure requires that returned instruments pass the same quality control tests as those used for new production instruments. Please contact the factory for instructions before shipping equipment.

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.



ORTEC 446 HIGH VOLTAGE POWER SUPPLY**1. DESCRIPTION**

The ORTEC 446 High Voltage Power Supply provides the well-regulated, highly stable voltage supply necessary for photomultiplier tubes, ionization chambers, and Li-drifted semiconductor detectors but is not recommended for use with surface barrier silicon detectors. An ORTEC 428 Detector Bias Supply is recommended for these devices. The 446 is supplied in a NIM standard module for maximum convenience. The 446 is designed for 115V ac input, and provides an output voltage continuously adjustable from 500 to 3000 volts with 0-10 milliamps current capability and switch selectable positive or negative polarity. The 446 is housed in dual-width NIM standard modules, completely conforming to the standards of TID-20893 (Rev.).

WARNING

THIS INSTRUMENT PRODUCES VOLTAGES WHICH CAN BE HAZARDOUS. ALWAYS HAVE POWER SWITCHED OFF BEFORE CONNECTING OR REMOVING CABLES TO THE UNITS TO WHICH ITS HIGH VOLTAGE OUTPUT IS APPLIED.

2. SPECIFICATIONS

INPUT: 103-129 volts, 47-65 Hz, 50 watts nominal. Power from a suitable ac source must be supplied through the three-wire captive line cord with standard NEMA male connector. The module is independent from the power distribution in a NIM Bin, in which it should be installed.

OUTPUT: 500 to 3000 volts, continuously adjustable, 0 to 10 milliamps current capability.

OUTPUT VOLTAGE CONTROLS: 3 range selector controls: 500-2500V in 500 volt steps; 0-400V in 100 volt steps; and 0-100V continuously variable using a ten-turn potentiometer with calibrated dial for fine adjustment.

OUTPUT POLARITY: positive or negative. Controlled by a switch located on the rear panel, to prevent inadvertent switching of polarity.

REGULATION: Not more than 0.0025% variation in output voltage for combined line and load variations within the operating range.

OUTPUT VOLTAGE STABILITY: <0.01% per hour (and <0.03% per any 24-hour period) variation in output voltage at constant line voltage, load and ambient temperature, after 30 minute warm-up period.

OUTPUT RIPPLE: <10 mV peak to peak from 2-50, 000 Hz.

CALIBRATION ACCURACY: difference between control settings and actual output voltage no more than $\pm 0.25\%$ of selected setting.

RESETTABILITY: output voltage can be reset to 0.1% accuracy or better.

OVERLOAD PROTECTION: built-in overload and short circuit protection with automatic power restoration upon fault clearance. Maximum allowable output current 13 mA.

TEMPERATURE STABILITY: <50 ppm change in output voltage per $^{\circ}\text{C}$ change in ambient temperature after one hour warm-up period.

OPERATING TEMPERATURE: 0-50 $^{\circ}\text{C}$.

OUTPUT CONNECTORS: 2 high voltage output connectors, Kings KV-79-13 or equivalent. Mating type Kings KV-59-22.

DIMENSIONS: Standard double-width module, 2.70 x 8.714 inches, per TID-20893 (Rev.).

3. INSTALLATION INSTRUCTIONS

3.1 General

The 446 is normally used in conjunction with other modular electronics and installed in the ORTEC 401A Bin. As such, it is rack mounted; therefore, it is necessary to ensure that vacuum tube equipment operating in the same rack has sufficient cooling air circulating to prevent any localized heating of the all-transistor circuitry used throughout the 446. The temperature of equipment mounted in racks can easily exceed the recommended maximum unless precautions are taken; the 446 should not be subjected to temperatures in excess of 50°C (120°F).

3.2 Connection to Power

The 446 contains all required power supplies to operate and receive input power by way of a 3-wire captive line cord with a standard NEMA male connector. The 446 should operate only on nominally 110V, 60 cycle ac power. This power supply may be operated outside the 401A Bin when desired, since it is totally self-contained.

3.3 Connecting Into A System

- A. Check to see that the power switch is in the OFF position.
- B. Plug the ac power cord into the appropriate receptacle.
- C. Check the polarity switch on the rear panel of the power supply to see that it indicated the appropriate polarity of high voltage.
- D. Connect the high voltage cables from the connectors located on the rear panel of the power supply to those instruments to be powered.
- E. Turn on high voltage power supply and select the desired voltage.

NOTE: This power supply should not be used with semiconductor detectors of the surface barrier silicon type, since these detectors will be destroyed if over-voltage exists even momentarily. The power supply recommended for use with these detectors is the ORTEC 428.

4. CORRECTIVE MAINTENANCE

These units should rarely require more than cleaning to prevent leakage paths from being created by dust collection. If a malfunction is noted, it is important to assure that it is truly within the unit by disconnecting the unit from its position in a system and performing routine diagnostic tests with a voltmeter. The power supply is short-circuit protected, and under a short circuit the output voltage will go to zero; if an external short circuit is applied to the power supply, the short circuit must be removed before the power supply will come back up to its full voltage.

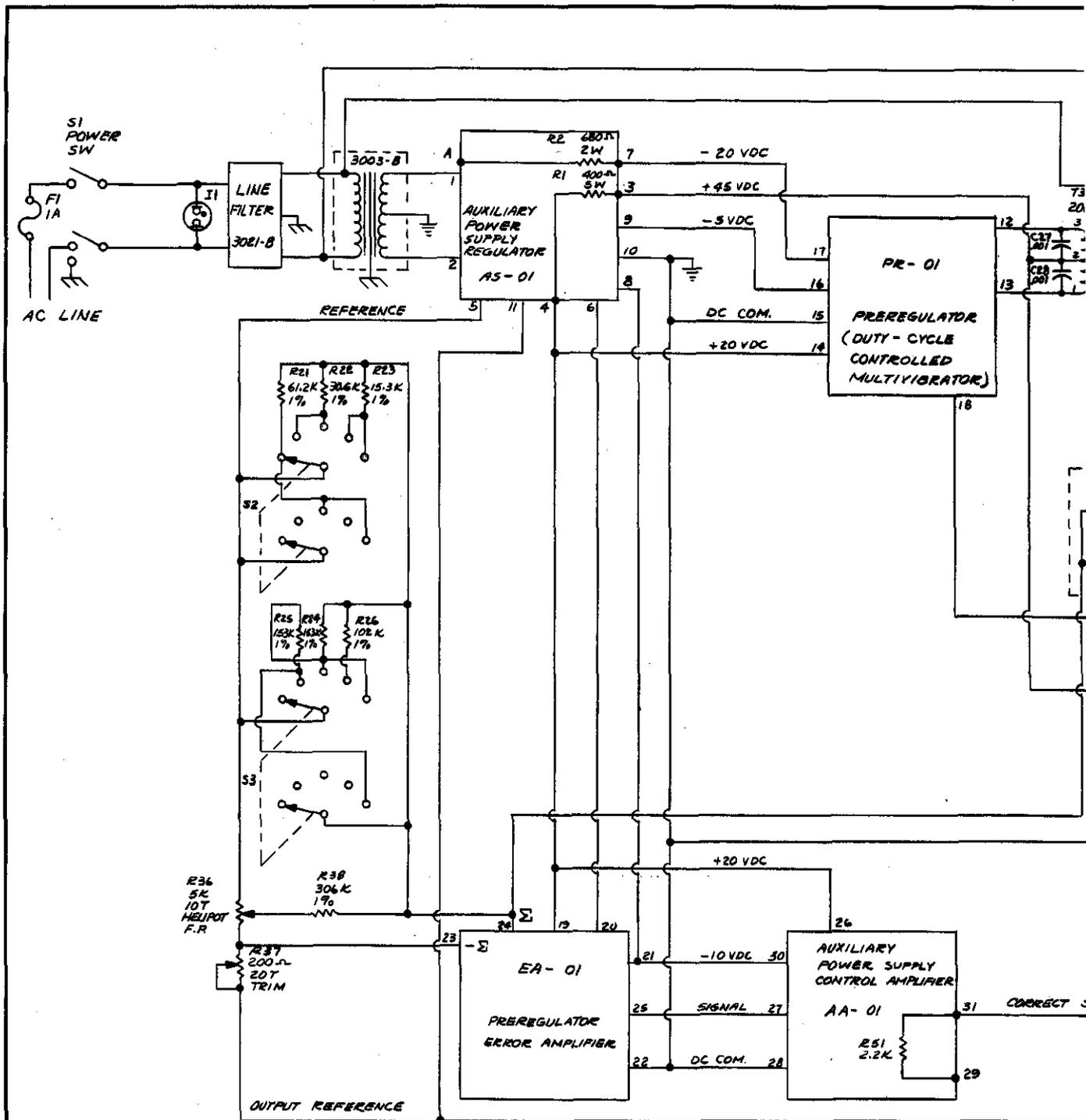
Troubleshooting

The troubleshooting procedures for this power supply should consist of simply removing the output load and measuring the output voltage and then applying a load and monitoring the output voltage to observe whether the power supply regulates or not. Internal dc measurements in the field may be performed since typical dc voltages are indicated on the schematic diagram. Be cautious when measuring voltage within this power supply because of the personnel hazard associated with the high voltages. The 446, or any ORTEC product, may be returned to the factory for repair service at any time at nominal cost. The standardized procedures require that each repaired instrument receive the same extensive quality control tests that a new instrument receives.

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

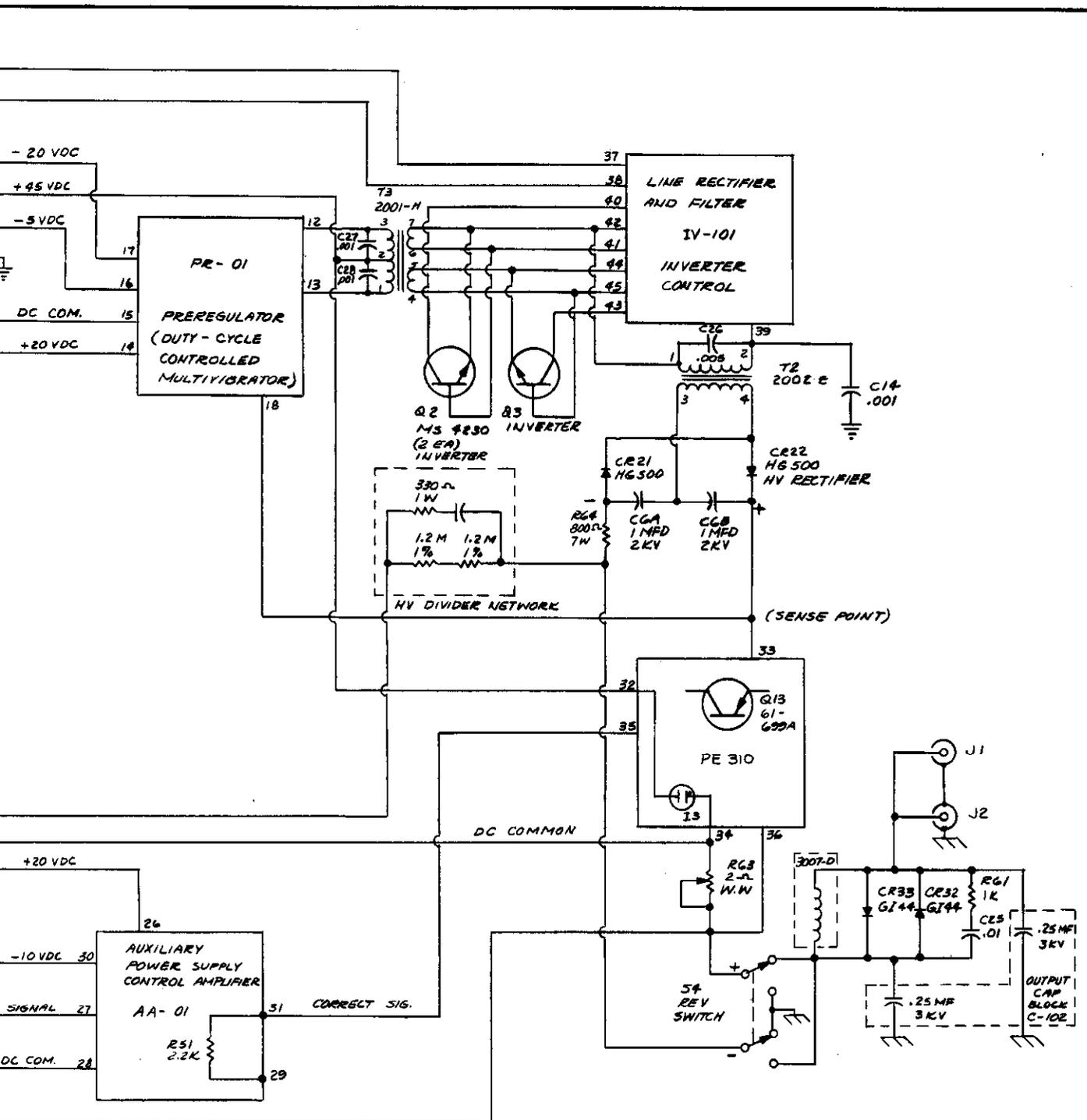
Pin	Function	Pin	Function
1	+3 volts	23	Reserved
2	- 3 volts	24	Reserved
3	Spare Bus	25	Reserved
4	Reserved Bus	26	Spare
5	Coaxial	27	Spare
6	Coaxial	*28	+24 volts
7	Coaxial	*29	- 24 volts
8	200 volts dc	30	Spare Bus
9	Spare	31	Carry No. 2
*10	+6 volts	32	Spare
*11	- 6 volts	*33	115 volts ac (Hot)
12	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.*



NOTE:

1. ⏏ INDICATES A NON-CHASSIS COMMON.
2. MODEL 446 FOR 115 VAC OPERATION.
MODEL 447 FOR 220 VAC OPERATION.



CHASSIS COMMON.
 OPERATION.
 OPERATION.

4-17-68 REVISED A 446-2	UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES			ORTEC INCORPORATED		100 MIDLAND ROAD, OAK RIDGE, TENNESSEE 37830
	TOLERANCES					
	FUNCTIONS	DECIMALS	ANGLES	FINISH		
	±.004	XX ±.01	±.030	✓		
APPROVAL			DATE			MODEL 446 OPERATIONAL BLOCK DIAGRAM (3KV/10MA POWER DESIGN POWER SUPPLY)
DESIGNED BY			RESPONSIBLE ENGINEER			DATE
J.D. WEBB 2-13-68			C.W. WILLIAMS			2/16/68
APPLIED PRACTICES			SCALE			DATE
			1X			3-7-68
DATE			RELEASED FOR USE			446-0101-01
1/10/68			3-7-68			