



RESEARCH ENERGY OF OHIO, INC.

10319 Wikel Road Huron, Ohio 44839

Phone: (419) 433-6103 Fax: (419-433-5726)

E-mail: [sales@researchenergy.com](mailto:sales@researchenergy.com)

Web: [www.researchenergy.com](http://www.researchenergy.com)

## OPERATION MANUAL

for the

CD450-4J Commercial and the

CD450-4J-M Military (Ref: NSN:1375-01-417-7104)

## BLASTING MACHINE

PERMISSION IS GRANTED TO PRINT THIS MANUAL FOR  
OWN USE OR FOR DISTRIBUTION PURPOSES

## TABLE OF CONTENTS

GENERAL INFORMATION . . . . .	3
SPECIFICATIONS . . . . .	3
Output Characteristics . . . . .	3
Power Source . . . . .	3
Physical Characteristics . . . . .	3
OPERATION . . . . .	4
Operational Test . . . . .	4
General Operating Procedure . . . . .	4
BATTERY . . . . .	6
Battery Life . . . . .	6
Battery Life Graph . . . . .	6
Battery Replacement . . . . .	6
REPAIRS . . . . .	7
USER INFORMATION AND LIMITED WARRANTY . . . . .	7
Disclaimer . . . . .	7
Limited Warranty . . . . .	8



### RESEARCH ENERGY OF OHIO, INC.

10319 Wikel Road Huron, Ohio 44839  
Phone: (419) 433-6103 Fax: (419-433-  
5726)

E-mail: [sales@researchenergy.com](mailto:sales@researchenergy.com)  
Web: [www.researchenergy.com](http://www.researchenergy.com)

## GENERAL INFORMATION

The Research Energy of Ohio, Inc. (REO) CD450-4J Blasting Machine is a single circuit capacitor discharge blasting machine using solid state electronics with an output energy of 4 joules. Primary power to charge the capacitor and to operate the electronics is derived from an internal 9 volt alkaline dry cell battery.

The READY TO FIRE indicator on the panel lights when the energy storage capacitor reaches 450 volts.

The Blasting Machine will shut down upon release of the CHARGE pushbutton switch.

The output terminals are shunted until the FIRE pushbutton switch is depressed. The terminal colors, RED (positive +) and Black (negative -) indicate polarity for connecting polarity sensitive igniters or detonators.

The machine cannot be fired until the voltage on the energy storage capacitor reaches 450 volts. When the READY TO FIRE indicator is lit, the voltage is regulated and very little battery current is used. Therefore, it is not necessary to immediately fire the blasting machine to conserve battery capacity.

## SPECIFICATIONS

### Output Characteristics:

Number circuits:	1
Nominal Capacitance:	47 MFD
Nominal Voltage:	450 VDC
Internal Resistance:	
At 74 ° F ( 24 ° C)	4 ohms
At 20 ° F ( -7 ° C)	6 ohms
At 0 ° F (-32 ° C)	11 ohms
Minimum Energy:	4 Joules
Electric Detonator Capacity*:	
Straight Series:	130 ohms
Parallel Series:	Not Recommended

\* Based on commercial U.S. standard detonator rating of 20 millijoules/ohm delivered in 5 milliseconds.

### Power Source:

Type:	Internal 9 volt ALKALINE battery, Eveready 522 or equal.
Quantity:	One required.
Voltage:	9 Volts DC.
Capacity:	Provides more than 350 charge-fire cycles (See Battery Life Graph on page 8).
Access:	Remove the bottom cover from the blasting machine.

### Physical Characteristics:

Overall size:	4.1 x 1.3 x 3.6 in. (10.5 x 3.4 x 9.0 cm.)
Weight:	10 oz. (0.3 kg.)
Enclosure:	Nylon/Fiberglass
Environment:	Water resistant

## OPERATION

WARNING: BLASTING PROCEDURES, ELECTRIC DETONATOR SELECTION, CIRCUIT DESIGN AND TIMING ARE THE RESPONSIBILITY OF THE USER. Consult with the designated Explosives Engineer and with the explosives suppliers for necessary information and training for safe, efficient blasts.

IMPORTANT: The READY TO FIRE indicator lights when the energy storage capacitor reaches the design voltage. It does not indicate energy. Since capacitor stored energy can only be measured when discharging, a lighted READY TO FIRE indicator does not assure that the blasting machine has sufficient energy to fire the electric detonators.

CAUTION: The output of the CD450-4J Blasting Machine is a "pulse" of voltage of relatively short duration. Multimeters, voltmeters and other field instruments cannot respond to this short duration voltage and therefore cannot be used to determine if the blasting machine output voltage is normal.

WARNING: DO NOT TEST THE BLASTING MACHINE NEAR ACTIVE BLAST SITES OR USING LIVE OR DANGEROUS EXPLOSIVE DEVICES.

### Operational Test

1. Depress the CHARGE switch and hold it down. The READY TO FIRE indicator should light after 1 to 5 seconds, and remain lit as long as the CHARGE switch is held down.

WARNING: DANGER-HIGH VOLTAGE-SHOCK HAZARD, KEEP BODY AND HANDS CLEAR OF TERMINALS AND CONDUCTORS. CONTACT WITH ELECTRICAL CONDUCTORS COULD CAUSE SERIOUS INJURY OR DEATH.

2. After the READY TO FIRE indicator lights continue holding the CHARGE switch down, wait at least 2 seconds, and then depress the FIRE switch. Continue holding both switches down for 3 seconds.
  - A. Verify that the READY TO FIRE indicator remains lit for approximately 1/4 second after the FIRE switch is depressed.
  - B. Verify that the READY TO FIRE indicator is unlit after 2A above.
3. After observing the above, release both switches.
4. Secure the blasting machine.

### General Operating Procedure

The following procedure is intended as a guide only, and each user must prepare and verify his own procedure consistent with Local, State, and Federal regulations.

CAUTION - USE OF THIS MACHINE REQUIRES THAT THE OPERATOR HAS BEEN TRAINED IN BLASTING TECHNIQUES.

WARNING: BATTERIES ALONE CAN FIRE ELECTRIC DETONATORS. KEEP BATTERIES AWAY FROM THE BLASTING CIRCUITS.

WARNING: NEVER CONNECT THE BLASTING CIRCUIT TO THE BLASTING MACHINE UNTIL YOU ARE READY TO FIRE THE BLAST.

1. Perform the Operational Test prior to bringing the blasting machine into the blast area.
2. Obtain electric detonator firing recommendations from the detonator manufacturer. Check the blasting circuit calculations prior to connecting to the Blasting Machine.
3. Connect the detonator wires to the lead lines using series or other circuits recommended by the detonator manufacturer.

CAUTION: Keep the lead lines shunted during wiring of the electric detonators.

4. MAKE SURE THAT ALL PERSONNEL HAVE BEEN REMOVED TO A SAFE LOCATION.
5. Check the electric detonator circuit continuity and resistance (including the lead lines) using an approved Blaster's Ohmmeter.
6. Shunt the lead lines after checking the circuits until the blast is ready to be fired.
7. Remove the shunted lead lines connection and connect the wires to the terminals on the blasting machine.

Note: The terminal colors, RED (positive +) and Black (negative - ) indicate polarity for connecting polarity sensitive igniters or detonators.

WARNING: KEEP HANDS AND BODY CLEAR OF CONDUCTORS. CONTACT WITH ELECTRICAL CONDUCTORS COULD CAUSE SERIOUS INJURY OR DEATH.

8. Depress the CHARGE switch and hold it down. The READY TO FIRE indicator lights when the capacitor reaches 450 volts. Release of the CHARGE switch will discharge the capacitor within 3 seconds.
9. When the READY TO FIRE indicator lights, continue holding the CHARGE switch down, wait at least 2 seconds, then firmly depress the FIRE switch. Continue holding both switches down until the firing operation is complete.

IMPORTANT: If the Blasting Machine should fail to fire, release both switches, disconnect and shunt the lead lines and notify personnel of blast delay.

10. After the firing operation is complete, wait 3 seconds then release both switches.

11. Disconnect and shunt the lead lines.
12. Secure the blasting machine.

## BATTERY

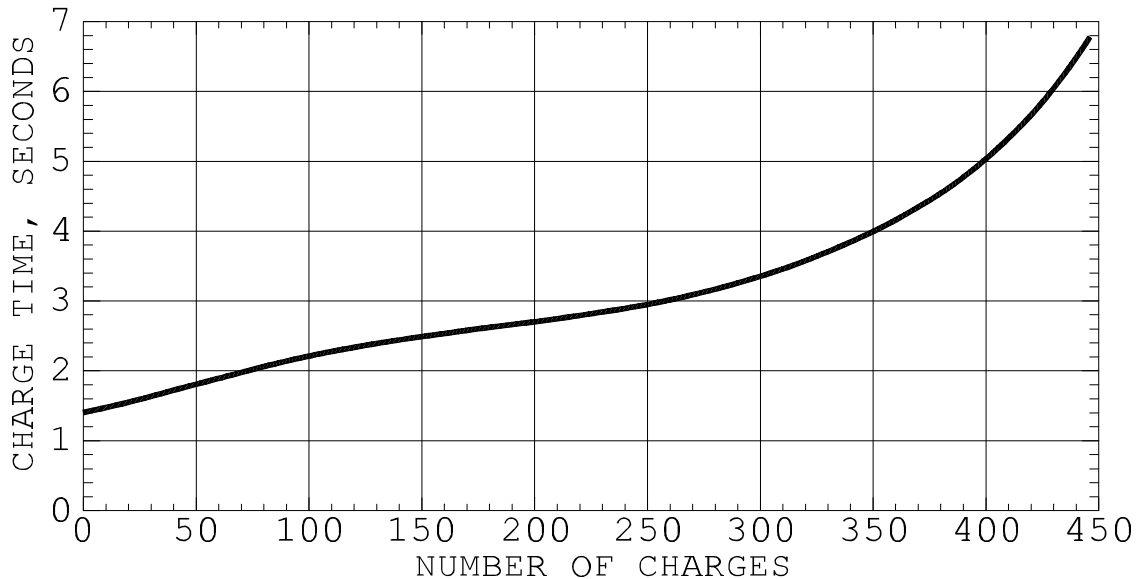
### Battery Life

Under normal use, an Alkaline type battery will last more than 350 charge- fire cycles. Battery replacement is required when the time required to charge the blasting machine (that is, the time required for the READY TO FIRE indicator to light after depressing the CHARGE switch) exceeds about 4 seconds. This is an arbitrary figure and is chosen because the battery is near end of life at this point as shown on the CD450-4J Battery Life Graph below. However, when the READY TO FIRE indicator lights, even if the charge time is greater than 4 seconds, the energy storage capacitor is charged to 450 volts and the Blasting Machine will fire with full energy output.

Test firing a blasting machine into a tester or charging to test the READY TO FIRE indicator depletes battery life the same as firing an actual blast.

### Battery Life Graph

ESTIMATED CD450-4J BATTERY LIFE



EVEREADY #522 NINE VOLT ALKALINE BATTERY.

### Battery Replacement

Remove the bottom cover to gain access to the battery. The CD450-4J Blasting Machine requires one 9 volt Alkaline battery, Eveready 522 or equal. After battery replacement, replace the bottom cover.

WARNING: DO NOT OPERATE THE BLASTING MACHINE WITHOUT THE BOTTOM COVER IN PLACE.

WARNING: USE ONLY AN ALKALINE TYPE BATTERY. Do not use a carbon-zinc type battery as it does not have the amperage capacity to operate the Blasting Machine.

CAUTION: OBSERVE POLARITY WHEN REPLACING THE BATTERY. INCORRECT POLARITY WILL DAMAGE THE BLASTING MACHINE.

CAUTION: WHEN REPLACING THE BATTERY, USE A NEW BATTERY. DO NOT USE A PARTIALLY USED BATTERY AS IT MAY LEAK CHEMICALS CAUSING SEVERE DAMAGE TO THE BLASTING MACHINE.

CAUTION: REMOVE THE BATTERY AND EXAMINE IT FOR CHEMICAL LEAKAGE AT LEAST EVERY SIX MONTHS. REPLACE THE BATTERY AT LEAST YEARLY EVEN IF NOT EXHAUSTED. DO NOT STORE THE BLASTING MACHINE FOR PROLONGED PERIODS WITH THE BATTERY INSTALLED.

## REPAIRS

The Blasting Machine must be repaired only at the factory to ensure quality workmanship and to update the blasting machine to current production standards. Exact replacement parts must be used. Each blasting machine repaired is subjected to the same quality control tests as new production. Such procedures, exact replacement parts and the specialized test equipment required is not available in the field or at other generalized repair shops.

If repair is required, please return the item with shipping charges prepaid to the factory at the address listed on the title page.

## USER INFORMATION AND LIMITED WARRANTY

### Disclaimer

The information contained in this manual is the instructions and recommendations of Research Energy of Ohio, Inc. Federal, State and/or Local laws, rules and regulations may alter the sequence of operating the equipment. It is the responsibility of the purchaser and user to insure use consistent with Federal, State and/or Local laws, rules and regulations. It is the responsibility of the receiving office to register this document to the appropriate department and person(s) responsible for blasting operations safety.

WARNING: BLASTING PROCEDURES, ELECTRIC DETONATOR SELECTION, DETONATOR CIRCUIT DESIGN, SHOT LAYOUT AND TIMING ARE THE RESPONSIBILITY OF THE USER. Consult with the Safety Department, the Explosives Engineer and the explosives suppliers for necessary information and training for safe, efficient blasts.

### Limited Warranty

Each unit is tested extensively before shipment and carries a 90 day LIMITED WARRANTY. If the unit fails to test or perform due to a defect in material or workmanship and is returned with shipping prepaid to Research Energy of Ohio, Inc., 10319 Wikel Road, Huron, Ohio 44839, it will be repaired or replaced at our option. This LIMITED WARRANTY is void if the equipment has been dismantled, altered, or otherwise abused in any way.

The above LIMITED WARRANTY is exclusive and in lieu of all warranties, express or implied, including any implied warranty of merchantability or fitness for a particular purpose. Under no circumstances shall Seller or Manufacturer be liable for damages of any description occasioned by or resulting from operation or use of this equipment.

We cannot anticipate all conditions under which this information and our products, or our products in combination with the products of other manufacturers, may be used and therefore accept no responsibility for the results obtained, the suitability or the safety of our products when used alone or in combination with other products. The user must make his own tests to determine the suitability and safety of each product and product combination for his own purpose. We sell the product without warranty and the buyers and users assume all responsibility and liability for all losses (including anticipated profits), consequential damages, or incidental damages arising from the use of our products alone or in combination with other products.

Use of this equipment by persons not authorized or not trained in safety and blasting techniques will make the warranty null and void.